

REPORT
ON
IMPROVED AGRICULTURAL
IMPLEMENTS
IN
MADRAS STATE



COMMITTEE ON PLAN PROJECTS
(AGRICULTURE TEAM)
NEW DELHI
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LETTER OF TRANSMITTAL

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D.O. No. COPP/Agri/F.2/64-1769.
COMMITTEE ON PLAN PROJECTS
PLANNING COMMISSION,
Link House (Fourth Floor)
3, Mathura Road, New Delhi.
March 30, 1964.

My dear Nanda,

I have great pleasure in forwarding to you the Report of the Agriculture Team on Improved Agricultural Implements for the Madras State. The Report is the result of the detailed studies conducted by the Team.

2. The findings of the Team reveal that the existing arrangements for research, manufacture and distribution of improved agricultural implements are inadequate in this State. Lack of co-ordination among the various agencies engaged in the programme, lengthy and cumbersome procedure involved in the procurement of raw materials, insufficient knowledge of the economics of implements, lack of standard designs, unrealistic estimates of the requirement of raw-materials and shortage of trained hands are the main contributing factors to the present state of affairs.

3. The Team has recommended closer co-ordination between the various departments, simplification of procurement procedures, detailed studies in the working and economics of improved implements, estimation of raw-material requirements on the basis of the number of implements required and the training of artisans with the practical manufacturers. The Team has drawn up blue prints and detailed specifications of raw materials required for various implements for use by the State. Further, it has been recommended that fast moving parts of implements such as plough shares and disc blades requiring high carbon steel may be manufactured by the Department and supplied to fabricators.

4. The recommendations of the Team have been accepted by the State Government. The Ministry of Food and Agriculture and the Ministry of Community Development are also in general agreement with the recommendations of the Team.

With best regards,

Yours sincerely,
A. P. Jain.

Shri G. L. Nanda,
Minister for Home Affairs.
New Delhi.
78 P.C.-1.

PREFACE

The Agriculture Team, appointed by the Committee on Plan Projects, Planning Commission, undertook the studies of Improve Agricultural Implements in the Madras State, in accordance with the terms of reference circulated to the State Government vide Committee on Plan Projects letter No. COPP/7/10/62 dated the 12th February 1963. The Team comprised Shri A. P. Jain, M.P (Leader), Dr. Arjan Singh and Shri B. M. Lakshmipathy (Members) and Dr. G. V. Chalam, Deputy Agricultural Commissioner, Ministry of Food and Agriculture as ex-officio Member.

2. The Team observed that the existing arrangements of research, manufacture and supply of improved agricultural implements in the State are rather weak and have made a number of recommendations to streamline programmes. In the field of research, it has been suggested to bring about closer coordination between the activities of the Research Testing and Training Centre, Coimbatore; Agricultural Engineering Section of the Agriculture College, Coimbatore; and the Agricultural Implements Workshop in the Intensive Agricultural District Programme, Thanjavur, with a view to effecting economy and efficiency. The Team has also recommended closer coordination between the activities of the Departments of Agriculture and Industries in respect of their manufacturing programme. It has also been recommended that the State Government should formulate a concrete manufacturing programme and supply raw material to the manufacturers on the basis of their previous year's production, installed capacity and the future manufacturing programme. The Team has suggested that the vital and fast moving parts of the agricultural implements requiring high quality steel, may be manufactured, on a mass scale, in the Government workshop and distributed amongst the fabricators after stamping them with the hall-mark of the Government. Reduction in the procurement procedure, exercising rigorous quality control, standardisation of implements and training of village artisans in the industrial manufacturing units and progressive fabricating concerns are some of the other important recommendations.

3. We take this opportunity to record our thanks to the Madras Government for the facilities afforded to the Team during its visit. We are especially indebted to Shri V. K. Karthikeyan, Director of Agriculture, and Shri P. K. Radhakanth, Agricultural Engineer, and other officers of the State for extending their cooperation.

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CHAPTER I

GENERAL BACKGROUND

1.1. The Madras State, with a population of 33,69 million, extends over an area of 50,331 square miles. In terms of population, it is the sixth largest State in the Indian Union, contributing 7.68 per cent towards the total population. The average density of population works out to 669 persons per square mile. Next to Kerala, West Bengal and Bihar, this is the most densely populated area in the country, the net area sown per capita of rural population being 0.6 acre as compared with 1.09 acres for the country.

1.2. *Natural Divisions.*—The State has three distinct natural divisions, the Coastal Plains; the Central Plateau; and the Western *Ghats*. The flat country along the eastern coast constitutes the coastal plains, which is further sub-divided into three regions namely (1) Coromandel Plains, comprising the districts of Chingleput, South Arcot and North Arcot; (2) Cauvery Delta including Thanjavur and a part of Tiruchirappalli district; and (3) Dry southern plains covering the districts of Madurai and Ramnathapuram and a part of Tirunelveli. The coastal plains between the Palar and Cauvery rivers are flanked on the West by the extension of the Eastern *Ghats* in a chain of low flat-topped hills, which in the South, meet the Cardamom hills in Madurai district. Between these hills and the Western *Ghats* is the plateau, with an average elevation of 1,000 feet, gradually rising westwards. This tract includes most of the Salem and Coimbatore districts and a part of North Arcot. The narrow strip of mountainous land all along the western and northern boundaries of the State, except the gaps of Palghat and Shencottah, form the third natural Division. It includes the Nilgiris, the Anamalais, the Palnis and the Shevaroyes.

1.3. *Agricultural Regions.*—Broadly speaking, the State can be divided into six agricultural regions:

1.3.1. *Carnatic Region.*—This region consists of Chingleput, North Arcot and South Arcot with a total cultivated area of about $3\frac{1}{2}$ million acres. It has a well distributed rain-fall, ranging from 35" to 40" (87.5 cm. to 100 cm.) in normal season. The coastal area receives slightly higher rain-fall than the inland district of North Arcot. The land consists mostly of alluvial flats with gentle undulating hills. Irrigation is largely done by tanks and to some extent by wells. The main crops grown are paddy, *ragi*, *cholam*, groundnut and sugarcane.

1.3.2. *Deltaic Region*.—This consists of Thanjavur, parts of Tiruchirappalli and South Arcot districts which form a vast tract of paddy fields served by Cauvery Irrigation System. Average rain-fall in this area is about 45" (112.5 cm.) more than half of which is received during the north east monsoon period. Paddy is the main crop of this area. Its sowing and transplanting are done with the onset of south-west monsoon, from June to August. In wet land, usually more than one crop of paddy is raised in a year. In some places, between the two crops of rice, a green manuring crop for the following rice crop or a pulse such as horse-gram, green-gram depending upon the moisture retaining capacity of the soil, is grown. In a part of the area, *ragi*, gingelly or *cumbu* is sown either before or after rice, depending upon the availability of source of irrigation. Groundnut and cotton are also grown after paddy in some cases.

1.3.3. *Central Arid Region*.—It consists of the districts of Salem, Coimbatore, parts of Tiruchirappalli, with a total cultivated area of about six million acres. It is an arid region of the State with an average rain-fall, ranging from 20" to 30" (50 cm. to 75 cm.). Millets, cotton and groundnut are the chief crops of this region. In Coimbatore, rain-fall is scanty, but sub-soil water is adequate. Lift Irrigation is, therefore, a common feature of the central districts and commercial crops like cotton, sugarcane and groundnut are mostly grown. In Tiruchirappalli, mainly wet paddy cultivation is done along the banks of Cauvery river. The remaining area is dependent on rainfall, where crops like *cumbu*, *cholam*, *ragi*, groundnut, red gram and castor are usually grown.

1.3.4. *Southern Dry Region*.—This tract comprises the districts of Madurai, Ramnathapuram and Tirunelveli with a cultivated area of five million acres and average annual rainfall of 30" (75 cm.). In the eastern part of the region, more rainfall is received from the north-east monsoon than from the south-west monsoon. In Tirunelveli district rains are received practically every month. While paddy is grown along the rivers, cotton is the second most important crop of the area. Amongst the millets, *cholam* is largely grown in Madurai and Tirunelveli districts and *cumbu* and *ragi* in Ramnathapuram district.

1.3.5. *Southern Region*.—It includes the district of Kanyakumari where excessive rainfall between 120" to 125" (300 cm. to 362.5 cm.) is received in the south-west monsoon period. Paddy is the chief crop of this region which is grown in the low lying areas. On the hill slopes and shallow well-drained soils, crops like tapioca and ginger are cultivated. Amongst the plantation crops, coconut is extensively grown.

1.3.6. *Nilgiris and other hill areas*.—The Nilgiris district, Kodaikanal (Madurai district), Anamalais (Coimbatore) and Shevroys (Salem district) form the hill areas of the State, with an elevation ranging from

3,000 to 8,000 feet. The climate of this area is temperate subtropical. The average rainfall is about 60" (150 cm.). The climate is cool and plantation crops predominate. Potato is the most important crop of the Nilgiris. To some extent, cereals are also raised. The agricultural practices differ widely in this area from those of the plains. Crops are mostly rain-fed and cultivation is almost entirely done by manual labour.

1.4. *Soils*.—Mainly three types of soils are met with viz. red, black and alluvial, of which red soil predominates. Mixed or brown soils which are in between the black and red soils are fairly common. In some places, where rainfall is scanty, saline soils are also found. The laterite soils are confined to high rainfall areas.

1.4.1. *Red Soil*.—These soils are found practically in every district of the State, their largest concentration being in Madurai, North Arcot, Chingleput, Salem, Coimbatore, Tirunelveli and Tiruchirappalli. These soils are generally shallow, having low moisture holding capacity and are poor in nitrogen, organic matter and available phosphoric acid. They are generally not as fertile as the black and alluvial soils. They have loamy texture and are, thus, suitable for the cultivation of a large variety of crops. Red soils of North Arcot region tend to be sandy, in South Arcot loamy and in Coimbatore clayey.

1.4.2. *Black Soils*.—These soils cover less than 25 per cent of the area and are mostly found in Ramnathapuram, Tirunelveli, South Arcot and Tiruchirappalli. 73 per cent of the cultivated area in Ramnathapuram and 35 per cent in South Arcot is black soil. These soils are generally clayey and fertile with high water holding capacity but they are poor in organic matter and available phosphoric acid. Their chief deficiency is nitrogen and for their cultivation the main limiting factor is water.

1.4.3. *Alluvial Soils*.—These soils are found in the deltas of Cauvery, Krishna and Godavari rivers and in belts along the tanks and other small rivers. These soils are usually most fertile. They have adequate supply of lime, potash and magnesium. The nitrogenous contents are, however, low, but the main deficiency is phosphoric acid.

1.5. *Land Utilisation*.—According to the professional survey carried out in 1960, the total area of the Madras State was 32.13 million acres, of which forests occupied 14.4 per cent, land not available for cultivation and other uncultivated lands constituted 32.3 per cent, and the remaining 53.3 per cent or 17.1 million acres formed the cultivated area, (2.5 million acres as current fallows and 14.6 million acres as the net area sown). The gross area sown was 17.4 million acres, with 2.8 million acres as the area sown more than once. Nearly 43 per cent of the cropped area or 39 per cent of the net area sown was irrigated. In the districts

of Thanjavur and Chingleput, as much as 78.7 per cent and 64.5 per cent respectively of the total area sown was irrigated. In other districts, the percentage of irrigated area to net area sown varied from 26.3 per cent in Tiruchirapalli to 45.4 per cent in Ramnathapuram. However, in Salem and Nilgiris it was only 17.0 per cent and 1.4 per cent respectively. The chief sources of irrigation are Government canals, tanks and wells, which account for 37 per cent, 36.6 per cent and 24.7 per cent respectively. Canals are the principal source of irrigation in the districts of Thanjavur; tanks in the districts of Ramnathapuram, Chingleput, Kanyakumari, Tirunelveli, North Arcot and South Arcot; and wells in the districts of Coimbatore and Salem.

1.6. *Climate*.—Madras has a warm tropical climate, which varies greatly from district to district, depending upon their topography and location in relation to the Western Ghats and its gaps. Broadly speaking, the agricultural year in this State can be divided into four periods; (1) the south-west monsoon period; (2) the north-east monsoon period; (3) the winter period; and (4) the hot weather period. The south-west monsoon normally sets in Madras in early June and begins to recede in September, bringing in its wake the north-east monsoon, which continues upto December. Unlike other parts of India, this monsoon is, by far, the most important for this State. The winter period *viz.*, January to February is almost dry, except for isolated showers. During the hot weather, scattered rains or thundershowers occur at most places. The rainfall from the south-west monsoon is the heaviest in the Nilgiris, Anamalais and the Palnis. Fairly heavy rainfall is also received in parts of Coimbatore, Salem and Carnatic region. Thanjavur and Tiruchirappalli get moderate rainfall but in the southern districts like Tirunelveli, Ramnathapuram and parts of Madurai and Coimbatore, it is low, as the passage of south-west monsoon is obstructed by the Western Ghats. The amount of rainfall received from the north-east monsoon depends upon the distance from the eastern coast, being heaviest in Madras, Chingleput, South Arcot and Thanjavur and lowest in areas away from the coast or the track of the monsoon. Besides two monsoon periods, some precipitation takes place in all districts during hot months. In Kanyakumari and Nilgiris, substantial rainfall takes place during this season. Generally speaking, nearly 3/4th of the area of the State receives less than 40" (100 cm.) rainfall, which results in semi-arid conditions.

1.7. *Crop Pattern*.—The total area under crops in the Madras State during the year 1959-60 was 17.4 million acres, of which rice, the staple crop of the State, occupied 5.72 million acres and accounted for nearly 33 per cent. Next to paddy, millets are the most important crops of the State, principal amongst them being *cholam*, *cumbu* and *ragi*, which constitute nearly 1/4th of the total cropped area. The non-food crops cover about 1/4th of the cropped area, of which oilseeds (14.5 per cent) and cotton (5.8 per cent) are the most important. The main oilseeds

of the State are groundnut and gingelly. While the former is grown over an area of about 2 million acres, the latter covers about 3 lakh acres. Cotton, which has been grown in this State from times immemorial, covers an area of one million acres. The prepartitioned Madras State used to be the largest cigarette tobacco producer in India but after re-organisation in 1956 most of the area under Virginia tobacco has gone over to Andhra Pradesh and in Tamilnad tobacco area is now even less than half a lakh acres. In some areas of South Arcot and Coimbatore, it is still an important cash crop. The principal fruit crops of the State are bananas and mangoes. The districts of Madurai, Tiruchirappalli and Thanjavur have the largest concentration of banana area, while the mango area is mostly in the districts of Kanyakumari, Salem, North Arcot and Madurai. Coconut is extensively grown in the southern district of Kanyakumari. Amongst the plantation crops, tea and coffee are grown in the hilly areas.

1.7.1. The district-wise study of crop statistics shows that rice is practically grown in all the districts, its percentage to total cropped area being 78.2 in Thanjavur and 74.9 in Chingleput, followed by Kanyakumari (52.1), South Arcot (37.1), Ramnathapuram (33.7) and North Arcot (31.5). In the Nilgiris and Salem, however, the percentage is less than 11. In the case of *cholam*, maximum percentage of the area is in Madurai and Coimbatore. In the comparatively well-developed areas of Chingleput, Thanjavur, Kanyakumari and North Arcot, *cholam* and *cumbu* are not cultivated. The most important area for *ragi* is Salem district, the next being Chingleput and North Arcot. The main areas of groundnut lie in North Arcot, South Arcot, Coimbatore and Madurai, while cotton is mostly grown in Tirunelveli, Coimbatore and Ramnathapuram.

1.8. *Yields*.—The general standard of cultivation in Madras State is high, as will be seen from the following table :

Average yield per acre (in lbs) 1961-62.

Sl. No.	Name of crop	Madras	All India	Percentage increase over India
1	Rice	1,351	900	50
2	<i>Cholam</i>	694	399	74
3	<i>Cumbu</i>	655	290	95
4	Groundnut	1,083	662	64
5	Cotton	152	94	62
6	Sugarcane	68,793	36,198	90

The average crop yields are much higher than the average yields of the country. In the case of rice, *cholam* and *cumbu* which are the principal crops of the State, the average yields are higher than the All-India averages by 50 per cent, 74 per cent, and 95 per cent respectively. Similarly, in groundnut and cotton, they are higher by 64 per cent and 62

per cent respectively. Sugarcane yields are almost double of the All-India figures. In comparison with some of the foreign countries the yields are, however, low and there is ample scope for improvement.

1.9. *Cultural Practices.*—Cultural practices vary greatly from place to place, according to agro-climatic conditions and the financial position and mental aptitude of individual cultivators. By and large, while the standard of cultivation in wet and garden lands is high, the dry lands do not receive adequate attention. The preparation of land for the sowing of the rainfed crops starts in the hot weather after some showers of rains and the extent of cultivation varies with the crops to be grown and the amount of rainfall, as also its frequency and interval. It is well recognized that timely cultivation of land is necessary to conserve moisture and for this reason farmers make every effort to stir the soil after every shower but very often, time is short and preparation of land is done rather hurriedly. Besides wooden ploughs, quite a number of other implements are also used for the preparation of land but of these bladed or serrated harrow is of special importance. In wet lands, transplantation of paddy is commonly done but in dry and semi-dry areas, the seed is generally broadcast or drilled in rows. Excepting paddy, intensive weeding is rarely done in the case of other crops especially those sown by broadcasting. At some places, toothed harrow is used for thinning and weeding of broadcast sown crops. The land is usually well prepared for sowing in the case of wet and garden lands, but when the interval between sowing and harvesting of next crop is short the preparation of land is rather perfunctory. Hoeing and weeding are generally done by the hand hoes and quite often blade harrows are also used for inter-culture and weed eradication in the row crops. The harvesting of crops is carried out by serrated sickle.

1.10. *Size of Holdings.*—According to the census conducted by the State Government in 1954-55, there were 4,131,352 holdings (excluding Kanyakumari and Nilgiris districts), extending over an area of 25,724,536 dry acres (an acre of garden and wet land taken as equivalent to 3 acres of dry land for conversion). On this basis, the average area per holding comes to about $6\frac{1}{4}$ acres of dry land or about 2 acres of irrigated land. The distribution of holdings and the area owned by various size-groups were as follows :

Group	No. of holdings	Percentage	Area (in dry acres)	Percentage
Upto 1 acre	814,327	19.8	460,148	1.8
1-5 acres	1,975,574	48.1	5,146,330	19.9
5-15 acres	1,010,702	24.8	8,431,980	32.5
15-30 acres	227,415	4.8	4,660,279	18.1
30-100 acres	92,549	2.2	4,347,929	17.1
Above 100 acres	11,785	0.3	2,707,849	10.6
Total	4,131,352	100.0	25,724,536	100.0

It will be observed that 67.9 per cent of the owners owned less than 5 dry acres; 24.8 per cent, 5 to 15 dry acres; 4.8 per cent, 15 to 30 dry acres; 2.2 per cent, 30 to 100 dry acres and only 0.3 per cent above 100 dry acres. As regards the area owned the owners of holdings upto 1 acre owned only 1.8 per cent of the area, while those between 1 and 5 acres, 19.9 per cent; 5 and 15 acres, 32.5 per cent; 15-30 acres, 18.1 per cent; 30 and 100 acres, 17.1 per cent and above 100 acres, 10.6 per cent. Broadly speaking, the owners of 15 dry acres or below constitute 92.7 per cent of the total number of owners, and they own only 54.2 per cent of the area. The holdings between 15 and 30 acres constituted 4.8 per cent of the total holdings and owned 18.1 per cent of the area. Holdings of 30 acres or above are only 2.5 per cent but they own 27.7 per cent of the area. It is apparent that while the bulk of the cultivators have tiny holdings, there is a sizeable group of cultivators holding 15 dry acres or above, who own nearly 46 per cent of the area in the State.

1.11. *Labour*.—According to 1961 census, the total number of workers in the State was 153.5 lakhs, of which the agricultural workers (cultivators and agricultural labourers) engaged in crop production accounted for 92.9 lakhs. Thus, agricultural workers constituted 60.5 per cent of the total workers, with cultivators as 42.07 per cent and agricultural labourers as 18.43 per cent. A study of the change in the number of agricultural workers between 1951 and 1961 reveals that the number of cultivators per hundred acres of net area sown has increased from 26 to 45 and the number of the agricultural labourers from 15 to 20. The number of agricultural labourers per 100 cultivators has, however, gone down from 58 to 45, i.e. by about 25.4 per cent. In Madras the load of agricultural labour per hundred cultivators is much higher than the average figure of 32 for the country, 14 for Punjab, 6 for Assam and 5 for Rajasthan. It is evident that agricultural labour in Madras is available in plenty. At some places, however, it came to the notice of the Team that shortage of labour was felt at peak periods of agricultural seasons.

1.12. *Wages*.—Agricultural labour is generally engaged on yearly as well as daily basis. Sometimes labour is also engaged on weekly and seasonal terms. There is also a system of engaging attached labourers, under which a small piece of land is given to a labourer free of rent for self-cultivation, bullocks and implements being provided by the landlord, on the condition that the labourer would work for the employer as and when required. The attached labourer is usually paid lower wages than the other casual workers. Generally, cash wages are predominant but for such operations as harvesting and threshing, wages are quite often paid in kind. Sometimes payment is also made partly in kind and partly in cash. In the case of daily workers, usual prerequisites, such as meals, *pan* and clothes are not given, but those engaged on yearly, monthly or seasonal basis are given these facilities.

1.12.1. Under the minimum wages Act, the Madras Government have fixed minimum wages for agricultural workers from Re. 0.75 to Rs. 1.25. The wage rates for different agricultural operations are not uniform, varying with the nature of work, strain involved, season and operation conditions and degree of skill required. According to the Second Agricultural Labour Enquiry Committee Report, the wages of adult male workers for important agricultural operations during the year 1950-51 and 1956-57 were as follows:

Operations	In Naya Paisa	
	1950-51	1956-57
Ploughing	107	91
Weeding	76	61
Transplanting	73	92
Harvesting	81	81
All agricultural operations	97	84

In the publication of the Ministry of Food and Agriculture on "Agricultural Wages in India", the wages of agricultural workers have been given under different classifications. Broadly, the unskilled agricultural workers have been classified under three heads *viz.*, field labour, herdsman and other agricultural labour. During the year 1959-60, the average wage rate for all these workers was as follows:

Field labour	Rs. 1.30
Herdsman	Re. 0.84
Other agricultural labour	Rs. 1.22

The average comes to about Rs. 1.12 which shows that the wages, after dropping in 1956-57, are now showing an upward trend. Further, it is also clear that maximum wages are paid for transplanting and ploughing and lowest wages are given for weeding.

1.12.2. Besides casual and seasonal labour, blacksmiths and carpenters are also engaged by the cultivators for the repair and manufacture of indigenous farm implements and tools on annual contract system and customary payment is made to them in the form of grains, green fodder, etc., at the harvest time. For other works, the artisans are engaged on daily wages. During the year 1959-60, wages of carpenters ranged between Rs. 2.31 and Rs. 2.45 while those of blacksmiths between Rs. 2.25 and Rs. 2.52. In comparison with some of the States in Northern India, wages of skilled and unskilled labour are very low, being almost half of those paid in the Punjab.

1.13. *Bullock Labour.*—According to 1961 census, the total number of working bullocks in the State is 41.40 lakhs. Since the net area sown

in the State is 14.6 million acres, the number of bullocks per 100 acres works out to 36, as compared with 24 for the country as a whole. The number of working bullocks varies greatly from area to area and district to district, depending upon the quality of cattle, nature of soil, means of irrigation, size of holdings and pattern of cropping. On an average, however, net area sown per pair of working animal is about 7 acres.

1.14. *Working Days*.—In this State, no systematic enquiry has been conducted in regard to the employment of manual and bullock labour on agricultural farms. The data available in some of the publications are very meagre and scanty. A pilot survey on farm and non-farm employment in South Arcot was conducted by Annamalai University under the aegis of the Indian Council of Agricultural Research in order to investigate the use of implements on farms of different sizes. Taking 300 working days as a measure of full employment in a year, it was observed that the present employment is only 112 days in dry zones and 186 days in garden lands. Even under favourable conditions such as assured water supply, opportunity for intensive cultivation, crop rotation, etc., employment attained was only 62 per cent of the full employment. The position is still worse in respect of women workers.

1.14. In the Labour Enquiry Report of the Ministry of Labour, similar conclusions have been drawn. Both of these enquiries have been conducted from the point of view of the employment of labour. But in this study, we are concerned with the extent of employment of men and bullocks available on the agricultural farms. Unlike Punjab, where the Board of Economic Enquiry is conducting regular studies on "Farm Accounts", no detailed information on this subject is available. Some idea about the employment of labour and bullocks on the farm can be had from the "Studies in Economics of Farm Management in Madras" which cover the districts of Coimbatore and Salem. They show that the total number of man-days required on a farm were 225, varying from 173 days in holdings of 2.5 acres or less to 283 days in 5 acres or above. Broadly, it is concluded that the women workers are employed on their own farms for about three months in a year while male workers are employed for six months.

1.15. *Agricultural Implements*.—Detailed information in regard to the use of Improved Agricultural Implements in the State is not available. At the time of quinquennial census of cattle, enumeration of ploughs, carts, sugarcane crushers, tractors, oil engines, electric pumps and *ghanis* is made. A statement showing the number of agricultural implements and machinery during the year 1961 is given in Annexure I. It will be observed that the State had 3,427,824 ploughs of all kinds. Separate figures for the iron ploughs are not available. It was, however, noticed that in Madurai, Ramnathapuram and Tanjore districts, in

addition to the country plough, Melur plough is quite popular. The use of tractors on the farm is on the increase, their number in 1961 being 1,390 against 822 in 1956. Remarkable progress is seen in regard to the use of electric motors. Since 1956, their number has almost increased to four-fold. Out of the total number of 1,60,000 electric pumps in the country, the Madras State accounted for nearly 62 per cent, as will be seen from the following table:

Name of implement	All India		Madras	
	1956	1961	1956	1961
Centrifugal pumps (Oil engines)	1,22,000	2,29,000	29,761	35,821
Electric pumps	55,000	1,60,000	23,988	98,501
Tractors	21,000	34,000	822	1,397

Maximum number of electric pumps are found in the districts of Coimbatore (35,534), followed by North Arcot (19,519), Salem (13,826), Chingleput (11,477), Madurai (8,822) and South Arcot (7,492), where rural electrification has taken place on a large scale.

1.15.1. Apart from indigenous implements, Mould-board Ploughs, Burmese Settun, Green Manure Trampler, Japanese Rotary Weeders, Wet Land Puddler, Sprayers and Dusters, etc., are becoming quite popular; the number of these implements used in the State is, however, not available. In order to watch the progress of the introduction of improved implements, it is necessary that steps should be taken to enumerate separately each type of improved implement at the time of quinquennial live-stock census.

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CHAPTER II

ORGANISATION

2.1. The State Departments of Agriculture, Rural Development, Industries and Cooperatives are, in one way or the other, concerned with the manufacture, extension and distribution of improved agricultural implements. Of these, the main responsibility for all this work as also for research, is that of the Department of Agriculture. The organisation of this Department, in so far as it relates to the agricultural implements, is as follows:

2.2. *Department of Agriculture.*—The Director of Agriculture is the administrative head of the Department. He is assisted by the Dean of Agricultural College and Research Institute, Coimbatore who is also an ex-officio Additional Director of Agriculture, incharge of agricultural education, and direction and coordination of agricultural research in the State. The Agricultural Engineering Section at Coimbatore College was set up in 1928. In the beginning the activities of this section were mostly confined to teaching and research but with the increased tempo of developmental work, the status of the Head of this Section was raised to that of the Joint Director of Agriculture (Engineering) with effect from 1946. He is, at present, assisted by three officers at the headquarters; one Assistant Agricultural Engineer functioning as Personal Assistant; one Deputy Director of Agriculture (Drilling) and one Agricultural Engineer (Soil Conservation). For research, distribution and extension work relating to improved agricultural implements, the following staff is working at different places:

2.2.1. *Research.*—The Research Testing and Training Centre is located at Coimbatore. It is under the charge of a Class I officer, designated as Research Engineer, who is assisted by Technical Assistants and other subordinate staff, such as farm mechanics, blacksmiths, carpenters, fitters, etc. There is also an Assistant Agricultural Engineer, (Research) at the Agriculture College, Coimbatore. His main task is also that of designing and evolution of new agricultural implements, making them available to the manufacturing units and approved private fabricators for their production.

2.2.2. *Distribution and Demonstration.*—This work is attended to by the Agricultural Engineer (Implements), stationed at Madras. He has been appointed under the Pilot Scheme for the distribution of Melur

and Mould-Board Ploughs to the cultivators, and is working directly under the control of the Joint Director of Agriculture (Engineering). He is also entrusted with the work connected with the procurement of iron and steel, formulating manufacturing programme, issuing permits for the distribution of iron and steel among fabricators and recommending suitable fabricators for being placed on the approved list of the Department of Agriculture. For demonstration work, the Agricultural Engineer (Implements), has been provided with one supervisor-cum-mechanic in each district. This scheme has been started from the current year.

2.2.3. *Extension.*—The set-up of the Department of Agriculture for extension work follows the general pattern in vogue in the country. For all development work relating to agriculture, which includes demonstration, popularisation and distribution of agricultural implements amongst the cultivators, the State has been divided into four Agricultural regions viz., Madras, Thanjavur, Madurai and Coimbatore, each under the charge of a Deputy Director of Agriculture. Each region includes two to four Revenue Districts or five to seven Agricultural Districts. In all, there are 35 Agricultural Districts. An Agricultural District is under the charge of a District Agricultural Officer. The number of District Agricultural Officers working in Revenue Districts are: Thanjavur-6, Coimbatore-4, Tiruchirapalli-4, North Arcot, South Arcot, Salem, Madurai and Tirunelveli 3 each, Chingleput and Ramnathapuram 2 each, and Nilgiris and Kanyakumari 1 each. There is, however, no separate staff for the agricultural implements. At the Block Level the Agricultural Extension Officers assisted by the Village Level Workers, one Fieldman and two Kamdars are responsible for extension work. The services of these officers have been placed at the disposal of Panchayat Unions, under the administrative control of the Union Panchayat Commissioners (Block Development Officers), who are the Chief Executive Officers of these Unions and have been declared as drawing and disbursing officers in respect of all staff working at Panchayat Union Level.

2.2.4. *Tractor Repair and Servicing Centres.*—The Department owns a large fleet of tractors for land reclamation and hires them out to the cultivators for ploughing, levelling, etc. In order to provide repair, servicing and maintenance facilities for the tractor units, the Department runs three tractor Repair and Servicing Centres at three places, viz., Madras, Trichi and Coimbatore. The Engineer incharge of Government Workshop, Madras, is designated as General Superintendent. The one at Trichi is known as Agricultural Engineer and third at Coimbatore as Assistant Agricultural Engineer.

2.2.5. *Agricultural Engineer (Drilling).*—For well boring work, the State has been divided into 10 zones, each zone being put under the charge of an Assistant Agricultural Engineer. In addition to drilling work, this

officer is also responsible for the implementation of schemes connected with lift irrigation, hiring of pump sets and hire-purchase of oil engines and electric motor pumping sets, tractor hiring and tractor hire-purchase. Excepting agricultural implements and soil conservation, all other engineering field work is looked after by the Assistant Agricultural Engineers who are assisted by a number of Agricultural Engineering Supervisors working on functional basis. The Head of the organization at the State level is Deputy Director of Agriculture (Drilling) who is responsible for technical guidance only. The Assistant Engineers are under the control of the Regional Deputy Directors of Agriculture who are held responsible for all development work and fulfilment of targets of various schemes within their jurisdiction.

2.2.6. *Soil Conservation*.—Soil conservation began to receive attention in this State during the First Five Year Plan and is now steadily developing in scope and size. For the works undertaken directly by the Department of Agriculture, there are, at present, ten Assistant Agricultural Engineers (Soil Conservation) with necessary field staff. At the State level, the Agricultural Engineer stationed at Madras is incharge of this organisation. Some works of soil conservation have also been entrusted to the Panchayat Unions. For assisting them in the execution of the programme, the State has appointed a Divisional Engineer (Agriculture) stationed at Salem. He has seven Assistant Agricultural Engineers to assist him at various places.

2.3. *Special Engineers*.—An Agricultural Engineer has been posted as incharge of the proposed Agricultural Implements Workshop to be set up at Tiruvarur under the Intensive Agricultural District Programme (Package Programme). This officer is to help the Project Executive Officer for designing new implements and promoting their use amongst the cultivators in the district. The proposed workshop at Tiruvarur will be directly under the control of Project Officer, who is the Drawing and Disbursing Officer of the Project. It is envisaged that there would be some technical control of the Joint Director of Agriculture (Engineering), Madras, on this workshop and the staff. The Team feels that unless close coordination between the officers engaged in the improvement of Agricultural Implements is brought about, there is bound to be duplication of work and wastage of efforts and funds.

2.3.1. *Annamalai University*.—The University maintains a College of Agriculture which trains agricultural students for the degree courses. These courses include the subject of agricultural engineering. From 1962-63, the University has also started one year's post-graduate course, leading to the degree of M.Sc. in Agricultural Engineering. Realising that a period of one year was too short to complete the course of study, the Syndicate in their last meeting decided to increase the duration to two

years. The Team, however, feels that although the main drawback has been removed, the facilities available for the training are inadequate and there is a considerable scope for bringing about improvement in equipment, laboratory and the staff.

2.3.2. Agricultural College and Research Institute, Coimbatore.—At the Agricultural College and Research Institute, there are two Assistant Agricultural Engineers; one for research and the other for teaching fundamental knowledge of agricultural engineering to the students. The Research Wing of engineering branch of the Department at Coimbatore has played a very important role in designing new implements and modifying indigenous implements.

2.4. Plant Protection.—The Department of Agriculture has a well-organised unit to deal with the plant protection work, which includes the supply of equipment like sprayers and dusters on subsidised basis to the agriculturists. For this purpose, the Director of Agriculture is assisted by two Plant Protection Officers; one for the control of insect pests (Entomology) and other for plant diseases (Mycology). In districts also there are two Plant Protection Assistants; one for the control of plant diseases and the other for insect pests. Where the incidence of pests and diseases is usually heavy, additional Plant Protection Assistants and misteries are provided.

2.5. Total Strength of Engineering Staff.—The set-up of the organization dealing with Agricultural Engineering activities in Madras State is illustrated in Annexure II. It shows that there are 28 Assistant Agricultural Engineers posted in different districts under one or another scheme. Thus, in some of the districts there are three to four Assistant Agricultural Engineers. In addition, there are four Assistant Agricultural Engineers at different places on special duties. Thus, there are 32 gazetted officers in the State. It was observed by the Team, that the number of subordinates to assist these officers was inadequate and it would be desirable to provide the requisite number of assistants for more efficient execution of the programme.

2.6. Department of Industries.—This Department has taken up the manufacture of agricultural implements through some manufacturers by supplying them iron and steel out of their industrial quota. The organisational set-up of this Department dealing with the procurement of iron and steel and their supplies to the industries, is headed by the Joint Director of Engineering. He is assisted by an Administrative Officer. The Industries Department does not make use of the agricultural quota of iron and steel for the manufacture of agricultural implements as the supply of that quota is uncertain and delayed. The Department of Industries, in a reply to the questionnaire issued by the Team, has stated that

coordination between the Industries Department and Department of Agriculture in regard to the manufacture of agricultural implements and supply of iron and steel is lacking. Recently, however, the services of an Agricultural Engineer have been taken over by the Industries Department from the Department of Agriculture in order to place the entire programme of manufacture of agricultural implements on a sound footing by drawing up a phased programme of manufacture, supply of iron and steel and its distribution. It is hoped that with this new arrangement, closer coordination between the Departments of Agriculture and Industries will be established. It will also be desirable to associate the Joint Director of Agriculture (Engineering) when the annual programme is drawn up so that manufacture of agricultural implements by the private fabricators is fully coordinated with the programme of industrial units.

2.7. Cooperative Department.—The Cooperative Department has taken up the manufacture of agricultural implements to a very limited extent. The Department has, however, been entrusted with the distribution of iron and steel, and the whole-sale District Cooperative Societies have been recognised as Registered Stock holders. Some Cooperative Societies are also engaged in the distribution of agricultural implements.

2.8. Coordination.—It is apparent that there are a number of Departments and agencies who deal with different aspects of agricultural implements. The research or the improvement of agricultural implements is being conducted at three places; (1) Agricultural Research Institute, Coimbatore; (2) Research Testing and Training Centre, Coimbatore; and (3) Agricultural Implements Workshop at Thanjavur. It is essential that the Research activities at these places should be closely integrated and coordinated. The designing of new implements or making improvements on indigenous implements and hand-tools is not a simple problem. It can be handled properly only by experienced Agricultural Engineers, who also possess adequate knowledge of implements in relation to their use on land. They must be fully conversant with the methods and practices of crop production, farm labour and water management and general economic conditions of cultivators. It will, therefore, be desirable to set up a first class Research Station for Agricultural Implements with a well-equipped workshop and other facilities. This can best be done at Coimbatore by combining the research section of the Agricultural College and Research Institute and the Research Testing and Training Centre. It will be better if the funds provided under the IADP are also made available for strengthening this section. Since conditions vary considerably from place to place, it will be necessary to set up at least four or five Regional Sub-Stations; one of which should be in the deltaic region, *i.e.* paddy area. The Team, therefore, recommends the re-organisation of the research section as suggested above.

2.8. At present, the agricultural engineering staff of the various schemes such as soil conservation, tractor hiring, lift irrigation and agricultural implements is working in, more or less, water tight compartments. Since agricultural operations are integrated, the Team is of the opinion that interchangeability and co-ordination among these officers should be established which will enrich and improve the working efficiency of the Department. For this purpose it will be necessary to arrange in-service training and reorganize the set-up.



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CHAPTER III

RESEARCH

3.1. *Agricultural Engineering.*—Unlike certain other branches of Engineering—Civil, Mechanical and Electrical—Agricultural Engineering has begun to be recognised as a specialised branch of Engineering study only recently. Formerly it was believed that a person trained in mechanical engineering was good enough to work on the improvement of farm implements. Slowly, it began to be realized that agricultural engineering was not merely the application of the principles of mechanics to the processes of farming but it required detailed knowledge of crop production, agronomic practices, soil properties, soil and water management with reference to crop production and socio-economic conditions of the farmers. Accordingly, at some of the Engineering Institutes in our country, separate courses of study in Agricultural Engineering have recently been started. In Madras, only a small beginning was made last year at the Annamalai University by starting a course for M.Sc. in Agricultural Engineering.

3.2. *Earlier Efforts.*—Attempts to introduce iron ploughs and other foreign implements were made in the State even before the Department of Agriculture had started. As early as in 1863, the then Governor of Madras drew attention, among other things, to the low standard of farming due to the use of primitive and un-effective implements and placed orders in England for steel ploughs, harrows, cultivators, seed drills, threshing and winnowing machines, water lifts, etc. An area of 350 acres of land owned by Nawab of Carnatic was taken over by the Government for conducting trials with foreign implements and machinery, but no tangible progress was made. Even after the appointment of a whole-time officer as Director of Agriculture in 1906 and the establishment of the Agricultural College and Research Institute at Coimbatore in 1907, practically very little attention was paid to the improvement of agricultural implements for nearly two decades. It was only from 1928, when as a result of the recommendation of Royal Commission on Agriculture, a separate section of the Agricultural Engineering was established, with a small staff and workshop, at Coimbatore, that regular attention began to be paid to the improvement of indigenous implements and designing of new implements suited to local conditions. It was to be kept in mind that they should be cheap, light and portable and capable of being easily made and easily repaired locally. As few foreign implements could fulfil these conditions, their progress was retarded. The Research Section also undertook the testing of implements like iron ploughs, cane crushers,

sprayers, dusters, threshers, shellers, etc., manufactured by private fabricators, for their utility and suitability. Implements which were found suitable and superior to the indigenous counterparts were recommended for adoption by the cultivators. A summary of the implements thus evolved during the last thirty years is briefly given below :—

As plough is the most common implement used by farmer, attention was first paid to its improvement. Earlier workers tried to introduce foreign iron mould-board ploughs but these ploughs did not suit local conditions. They had, therefore, to be modified and adjusted for bullock-drive. In the case of light and medium ploughs, long shaft pole and single handle were fixed to suit local conditions. For stiff clayey soils, heavy ploughs were designed. A ridger plough was also designed for planting sugarcane, cotton, etc., in lines. An improved type of blade harrow, H. M. Guntaka, designed in early days was improved upon by a Research Engineer and was renamed as "R. E. Guntaka" whose main advantage was that it provided sufficient clearance between the blade and the shaft pole for the passage of clods without obstruction and that it could be fitted with 24" or 36" blade and reversible points. It could also be used for harvesting groundnut in light soil. Some of the other improved implements were the Ridge Plough, the Buck Scraper, the Bund Former, the Mechanized Seed Drill, the Wet-land Puddler, the Green Manuring Trampler, the Cultivator, Harrows and Rollers, Cotton Stalk Puller, Turmeric Polisher, Groundnut Decorticator and Seed Treating Drum. Intensive study was also made of various types of water lifts, with a view to effecting saving in labour and energy. In the case of mhot, wooden wheel was replaced by cast iron rollers with ball bearing in order to reduce friction and draft. Automatic tilting of mhot bucket was also introduced which became quite popular. Various water lifts, including pumps, were systematically studied for their efficiency and economy. Attention was also devoted to the improvement of bullock carts as iron-tyred bullock carts, besides doing considerable damage to roads, are heavy to pull. The carts fitted with pneumatic tyres proved more efficient and lighter than the indigenous carts. Designing of bullock harness and yokes was yet another line of work. It will, thus, be observed that the Engineering Section, after its creation in 1928, began to direct its attention to the improvement of practically every type of bullock-drawn implement and water lift. This work was, however, interrupted by the Second World War, when the services of Agricultural Engineers were utilised for more urgent and pressing problems.

After Independence, efforts to improve upon the implements designed earlier were restarted, and among the implements designed during the last fifteen years, mention may be made of the "Shanti Multipurpose Plough", the Ridger, Weeder, Paddy Thresher, Hand operated fertilizer distributor, Wind operated bird scarer, coir ropes, filter points, bullock-drawn

implements, etc. There are, thus, at present, quite a number of implements on the recommended list of the Department. The Team, however, regrets that very few of these implements are actually being used by the ryots. It is, therefore, suggested that the list should be carefully examined and it should include only those implements which are of real economic use and can be recommended to the cultivators which are within their reach.

3.3. *Surveys.*—Before any improvement work on systematic lines can be undertaken, it is necessary to make a detailed study of tools in use and prevailing conditions in different regions and to assess, as accurately as possible, the requirements of cultivators. With this end in view, the Indian Council of Agricultural Research initiated, on a coordinated basis, All-India Surveys of indigenous implements and hand tools commonly used in different parts of the country in the Second Five Year Plan. In Madras State, the first survey, covering ploughs, cultivators, harrows, hoes, seed drills, ridgers, bund formers, harvesting tools, etc., was completed in 1959. The Second Survey, dealing with additional implements such as water lifts, chaff cutters, cane crushers, groundnut decorticators, rice processing equipment, threshing machines, bullock carts, etc., was completed in 1961-62. These surveys have provided basic data in respect of design, weight, cost, out-put, quantity of work, estimated life, etc., of different implements. In order to find out the real worth of indigenous implements and tools, it is not only necessary to test them under different field conditions but also work out their efficiency, economics and requirement in relation to the capacity of bullocks. A third scheme, for the survey of Farm Structures in Coimbatore district was started in January 1962, which was completed on the 15th January 1963.

3.4. *Limitations of the Draft.*—The draft capacity of animal is a limiting factor and has to be kept in view while designing new implements. The Department of Agriculture, Madras, has carried out a good deal of research work on this subject. In the case of ploughs, it has been determined that the draft per square inch varies from 3 lbs. to 10 lbs. as shown below:*

Sandy Soils	3 lbs.
Sandy Loams	3—6 lbs.
Clay Loam	6—8 lbs.
Clay	8—10 lbs.

Thus, in the case of plough, cutting a furrow slice of 8" x 5", the draft will vary from 120 lbs. in sandy to 400 lbs. in clay soils. In some operations like harrowing, speed is necessary in order to improve the quality

*Source : Note Book of Agricultural Facts and Figures (1961).

as well as quantity of work. The effect of speed on draft was, therefore, worked out, which yielded the following data :*

Speed per hour	Draft required
1 mile	250 lbs.
2 miles	519 lbs.
3 miles	588 lbs.
4 miles	657 lbs.
5 miles	725 lbs.

It is evident that with increase in speed the draft required also goes up. Similarly, a good deal of work has also been done on the draft required for pulling the cart. On a level fairly metalled road, the force required is about 1/20th of the weight of a cart with load. Taking the weight as one ton, the force required will be about one cwt. Up a gradient of 1/100, the draft increases by 1/100 ton or 22.4 lbs. The effect of different types of roads on the draft has been indicated below:*

Loose sand road	315 lbs.
Average dry-earth road	150 lbs.
Good earth road	100 lbs.
Gravel road	80 lbs.
First class metalled road	55 lbs.
Tarred road	25 lbs.

Appreciable difference in draft was also found in the draft of the cart with a load of 3,000 lbs. and having wheels of different sizes:*

Kind of Road	38" wheel	40" wheel	42" wheel
Muddy road	441	367	342
Dry earth road	388	347	333
Metalled road	115	98	97

It is obvious that on muddy road, it is advantageous to have a wheel of larger size.

3.5. *Research Testing and Training Centres. Coimbatore.*—This Centre, started functioning in 1960. Its main objectives are:—

- (a) To test the bullock drawn and manually operated implements and machines available, and in use in different regions, under actual field conditions;

* Source:—Note Book of Agricultural Facts and Figures (1961)

- (b) To import from foreign countries or other parts of the country, improved implements and to develop, if necessary, suitable implements and machines for certain agricultural operations for which no implement exists at present and to test them for State conditions and requirements;
- (c) To modify or improve upon the agricultural implements and machines tested in the centre;
- (d) To introduce and popularise farm implements and machines found suitable;
- (e) To design and develop, simple labour-saving, cheap and efficient agricultural implements and machines for the State; and
- (f) To impart training in agricultural implements.

3.5.1. The approved technical programme of this centre includes the following items:

- (a) Designing of water lifts for 15' to 45' depth and evolving methods for reducing cost of filter points.
- (b) Designing of single animal-drawn implements and harness.
- (c) Evolution of suitable bullock gears for driving such machinery as water lifts, chaff cutters and threshers (design).
- (d) Evolving:
 - (i) animal-drawn potato digger.
 - (ii) animal-drawn groundnut digger; and
 - (iii) animal-drawn cotton-stalk puller.
- (e) Evolving the following paddy implements:
 - (i) Paddy seed drill (animal-operated).
 - (ii) Paddy transplanter (manually-operated).
 - (iii) Paddy harvester (manually operated).
 - (iv) Paddy thresher.
- (f) Testing of the following implements:
 - (i) Tooth-peg harrow (used in Madhya Pradesh).
 - (ii) Burmese Settun.
 - (iii) Poona Seed Drill for paddy.
 - (iv) Poona Bullock cart wheels (testing).
- (g) Draft studies:
 - (i) Melur and Konkan ploughs.
 - (ii) Gardin tools.
- (h) Training programme.

Recently, three more items have been included in this list.

- (i) Work on wheeled attachments to improved implements designed at this centre.
- (ii) Development of a hydraulic dynamometer.
- (iii) Development of a machine for dehussing arecanuts.

3.6. *Progress.*—It has come to the notice of the Team that some of the agricultural machinery and equipment meant for the workshop ordered from Japan had not so far reached the centre as it is still lying at Delhi with the Indian Council of Agricultural Research, for want of completion of formalities. Steps should be taken to set up the machinery immediately. The Team feels that in addition to the items of work already in hand, it is most essential to carefully look into the long list of implements designed and approved by the Department of Agriculture in earlier days. Only those implements should be selected which are of economic significance and can be confidently recommended to the cultivators, taking into account the local agricultural conditions.

3.7. *Future Work.*—Some of the suggestions which the Team offers are:

3.7.1. *Power tillers and implements.*—Although the agriculture labour is in plenty and cheap, the use of power, especially of electricity at the farms, is making rapid strides in the State. The farmers are showing considerable interest in the use of small tractors for wet-land paddy cultivation. It is, therefore, desirable that the State should carefully examine the question of mechanisation in Madras State and draw up a definite policy of promoting small scale mechanised cultivation. For this purpose, it will be desirable to enlarge the objectives and functions of the Research Testing and Training Centre, Coimbatore, and include small tractors and power implements and machinery such as power thresher, power sprayer, etc., in the programme of work.

3.7.2. *Paddy seed dryer.*—During the visit to the State, the Team noticed that one of the crops viz. the Kuruvai paddy, was very much affected by rains and wet weather in the harvesting season. For want of adequate equipment and facilities, the freshly harvested crop is commonly spread on the metalled roads, whenever a spell of dry weather comes. This results not only in great inconvenience and increased cost to the farmers, but also in deterioration of the quality and dislocation of the grains. The evolution of simple dryer is, thus, of paramount importance. The dryers in use, such as Heat Wagon under the Hybrid maize programme, or the steam dryer, designed in West Bengal, may be tried and modified to suit local conditions.

3.7.3. *Handtools and Garden tools.*—A good deal of agricultural operations are done by manually-operated tools such as spades, sickles, hoes,

etc., especially in hilly areas. It, therefore, seems necessary to start technical studies on the improvement of handtools so as to attain maximum efficiency and output by determining the most suitable postures for workers and shape and size of blades, handles and angle of attachment, etc.

3.7.4. A detailed study of the various parts of implements, quality of material required for their manufacture and measures that could be taken to reduce the cost of implements without reducing their usefulness or working life, should be undertaken and the results of the study published for the information of all manufacturing units and extension agencies.

3.7.5. *Desirability of Multipurposes Implements.*—Efforts are being made to evolve a multipurpose tillage implement, viz., 'Shanti Plough' but it has not so far yielded fruitful results. It is desirable to make this a subject of a detailed and closer study as an ordinary cultivator does not have the means to go in for a large variety of single purpose improved implements.



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CHAPTER IV

RAW MATERIAL

4.1. *Raw Material required.*—Broadly speaking, indigenous implements are fabricated mostly from wood, and iron is used only for making parts which cut the soil or the crop such as blades, shares or their points. Wood is locally available and before use it is well seasoned. It may be hard or soft according to the requirements and functions of different parts of the implements. For iron and steel, coke and coal, the manufacturers have to depend generally upon the supplies available to them either from the Iron and Steel Controller and Coal Controller through the Departments of Agriculture and Industries or from the open market. Commonly three categories of iron and steel are used in the manufacture of implements viz. (1) mild steel plates, bars and rounds, (2) cast iron, and (3) high carbon and spring steel.

4.2. *Supply position.*—During its first meeting with the State Minister for Agriculture and other officials the Team was informed that the non-availability of iron and steel in adequate quantities was one of the biggest handicaps in undertaking large-scale programme of manufacture and supply of agricultural implements. In support of this, the following figures in respect of the indents placed with the Iron and Steel Controller and supplies received during the last four years were given:

Year	Quantity indented (in tons)		Quantity received (in tons)	
	Standard material	Non- standard material	Standard material	Non- standard material
1958-59	2,998	775	1,372	1,375
1959-60	3,748	1,072	776	1,360
1960-61	13,517	1,167	2,940	1,182
1961-62	3,213	1,557	930	1,143

It shows that the standard material received during the four years was only $\frac{1}{4}$ th of the quantity indented for. In the case of non-standard material nearly 53 per cent of the requirements were met. Such a position cannot apparently be regarded as satisfactory. In drawing conclusion from these figures, the possibility of over-indenting cannot be ruled

out. For instance, in the year 1960-61, an indent for 13,517 tons was placed as against 3,748 tons and 2,998 tons in 1959-60 and 1958-59 respectively. The Department of Agriculture has estimated yearly requirements at about 6,000 tons during the Third Plan. Thus, if the figures for the year 1960-61 were excluded, being abnormal, the percentage of receipts to indents will work out to about 52.

4.3. *Distribution.*—The year-wise distribution of iron and steel under the agricultural quota amongst the fabricators was as follows:

Year	Issue of iron and steel		Percentage to receipt	
	Standard	Non-standard	Standard	Non-standard
1	2	3	4	5
1957-58	2,000	980	..	..
1958-59	1,372	1,375	100	100
1959-60	204	1,360	26	100
1960-61	556	1,180	19	100
1961-62	930	1,145	100	100

It will be seen that in the years 1959-60 and 1960-61, only 26 per cent and 19 per cent respectively of the standard material was available to the manufacturers of agricultural implements. The rest of it was either utilized by the Department for their own work or was given to other fabricators. The system of distribution thus, needs examination.

4.4. *Procurement procedure of iron and steel.*—Planning and indenting of iron and steel under agricultural quota is done by the Department of Agriculture, through the Joint Director (Agricultural Engineering). He works under the over-all supervision and control of the Director of Agriculture, who is the State Controller of Iron and Steel for the agricultural quota. The procurement procedure of iron and steel in this State is similar to elsewhere in the country. Briefly speaking; the Department of Agriculture submits its indent to the Iron and Steel Controller through the Ministry of Food and Agriculture, New Delhi who on receipt of quota for the country allots it amongst the States on a *pro-rata* basis according to supply and demand. On receipt of allocation the Joint Director (Agricultural Engineering) splits up the allotment amongst the District Marketing Cooperative Societies who are approved as registered stockists and issues certificates to them. The Marketing Societies place their orders on the producers through the Iron and Steel Controller.

4.5. *Planning and Indenting.*—During our discussion with the Joint Director (Agricultural Engineering), it was found that the estimates of requirements of iron and steel for the agricultural implements were more or less made on *ad hoc* basis, taking into consideration previous years figures. We were also informed that there is no:—

- (a) clear-cut programme regarding the number of implements to be manufactured, and estimates of iron and steel required for their manufacture; and
- (b) information regarding the number of fabricators, the present installed capacity of the manufacturing units and their present production programme.

4.6. *Distribution Procedure.*—With effect from July 1950, the distribution of iron and steel, including flats for cart wheel, G. C. sheets, pipes, etc., to the ryots, has been entrusted to District Cooperative Marketing Societies which are functioning as Registered Stockists. On receipt of iron and steel, they send intimation to the Joint Director (Agricultural Engineering) who makes necessary arrangements for its distribution. After keeping a part of the supply in reserve for Departmental work, the remaining quantities are allotted equally amongst the fabricators on the Department list, irrespective of their manufacturing capacity, type and quality of implements manufactured.

4.7. *Distribution Agencies.*—At present, the distribution of iron and steel is done by the District Cooperative Marketing Societies through their sale depots but this arrangement is not considered satisfactory and a proposal is now under consideration of the Director of Industries and Commerce to appoint Taluqa Cooperative Marketing Societies as sub-stockists. This is a commendable step and the Team welcomes the idea of arranging distribution of all iron and steel for agricultural purposes through the Cooperative Societies.

4.8. *Supervision of the utilization of iron and steel allotted to fabricators.*—To ensure the utilization of iron and steel, a copy of the allotment order is sent to the concerned District Agricultural Officer but as he is not fully acquainted with the numerous sections of iron and steel required for the manufacture of implements and other parts, he is not in a position to exercise effective control on the utilization of material. The Team noticed, during their visit to some places in the State that the District Agricultural Officers could not even supply full data in regard to the iron received and the number of implements manufactured. A surprise visit to some of the manufacturing units at Rajapalayam also showed that one of the firms was obtaining mainly sheets which are in short supply and could be sold in the free market at very much

higher price than the controlled rates. The premises of this manufacturer presented the looks of an iron-store rather than that of a workshop. The present system of exercising check on the utilization of iron and steel, therefore, needs revision.

4.9. Case-Studies.—In order to form an idea of time required for obtaining iron and steel through normal procedure, the Team studied the records of the Department of Agriculture and those of a few registered stockists. The details of these cases are given in Annexure IV. Its study will show that not less than three years are required to get iron and steel under the agricultural quota system. Further, one is not sure of getting the sections indented for. It is for this reason, that the Director of Industries and Commerce has observed that he is utilizing the small scale industries quota for the manufacture of agricultural implements as agricultural quota is not dependable.

4.10. Suggestions for modification of procedure.—The Team is of the opinion that there is an urgent need for modification of the present system of assessing the requirements procedure involved in the submission of indents and procurement of supplies. Instead of estimating the requirements on an *ad hoc* basis, we suggest that every year, well ahead of the date for the submission of indents to the Iron and Steel Controller, the Agricultural Engineer should call for information from all fabricators of the improved implements and artisans in respect of their production capacity, implements manufactured and sold during the previous year, manufacturing programme and requirements of iron and steel (section-wise) for the next year. While the fabricators of improved implements may be required to submit this information through the District Agricultural Officers, the requirements of other manufacturers and artisans in respect of repair and replacement of indigenous handtools and implements may be obtained through the Panchayat and Development Officers. The assessment of the requirements of the State should be made on the basis of detailed information thus received and then split up into unrelaxed, relaxed and decontrolled categories. For 50 per cent of these requirements, the Agricultural Engineer may be authorised to sponsor the indents straightaway to the Iron and Steel Controller. For the remaining requirements, supplementary indents may be submitted after thorough check and verification of the information received from the fabricators. It will be necessary to do away with the practice now followed, of routing the indents through the Ministry of Food and Agriculture to the Iron and Steel Controller. We suggest that the present system may be carefully examined and advance long-term planning done for a period of five years and tentative annual quota may be allotted to the State subject to modification from time to time. The State Government

should be authorised to submit their quota direct to the Iron and Steel Controller within these limits.

4.11. *Modification of the system of equi-distribution of agricultural quota amongst the fabricators.*—The present policy of equi-distribution of iron and steel out of the agricultural quota to fabricators requires to be stopped as it is neither reasonable nor conducive to efficiency. The Team feels that the supply of raw-materials should be based on the previous years production and future manufacturing programme of the fabricators.

4.12. *Estimate of requirement of iron and steel.*—The State Government has estimated that about 6,000 tons of iron and steel will be required annually. In the Third Five Year Plan of the State, it was estimated that the production and popularisation programme should be phased on the basis of an annual replacement of at least three to five million ploughs. If this replacement is made by Mould-Board Plough, the annual requirement of iron and steel for ploughs alone will be 30,000 to 50,000 metric tons. Besides, the production of other Agricultural Implements would require large quantities of steel. It appears that the State Government's figure is non-realistic. As stated in para 4.10, the estimates of iron and steel (section-wise) must be framed according to requirements of iron and steel for different parts of implements planned to be manufactured in the next five years.

4.13. *Supply of pig iron, coal and coke.*—Coke, coal and pig iron for agricultural purposes are allotted by the Director of Industries and Commerce, Madras, subject to the availability of stocks. During the visit of the Team, some of the fabricators represented that pig iron was in short supply. We, therefore, suggest that like iron and steel and coal, a separate quota for pig iron may be fixed for agricultural purposes.

CHAPTER V

MANUFACTURE

5.1. *Manufacturing System.*—While there is a long list of implements approved by the Department of Agriculture, only a few of them are, at present, being manufactured and distributed. These implements are being manufactured by three agencies: (a) approved fabricators of the Department of Agriculture; (b) Industrial Manufacturing Units of the Department of Industries; and (c) Cooperative Marketing Societies. The number of approved fabricators with the Department of Agriculture, at present, is 150. It is proposed to increase it to 250 by the end of the Third Plan. The Department of Industries has set up Industrial Units at nine places and a scheme is now under implementation for the establishment of eight more units, thus bringing the total number to 17. Out of these, only four units are, at present, participating in the programme of manufacturing agricultural implements. The manufacture of agricultural implements has just been taken up by 14 Primary Cooperative Marketing Societies in the State and the Registrar, Cooperative Societies, feels that more societies could not go into this business due to shortage of raw material. The district-wise distribution of these agencies is given below:

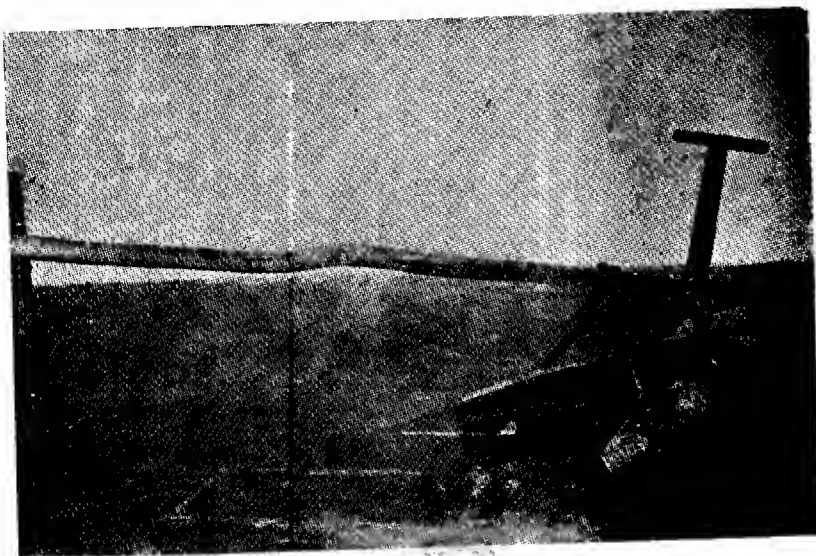
S. No.	Name of District	Number of approved fabricators	Number of Industrial Manufacturing Units	Number of Cooperative Manufacturers
1	Madras	7	..	..
2	Chingleput	7	..	2
3	North Arcot	5	1	1
4	South Arcot	6	2	6
5	Tiruchirappali	12	2	2
6	Thanjavur	12	3	..
7	Salem	12	2	..
8	Coimbatore	13	2	..
9	Madurai	25	2	1
10	Ramnathapuram	16	..	..
11	Tirunelveli	35	2	2
12	Kanyakumari	..	1	..
13	Nilgiris	..	..	..
Total in State		150	17	14

It will be observed that the largest number of approved fabricators is in Tirunelveli followed by Madurai. In the districts of Kanyakumari and Nilgiris, there are no fabricators and in such important districts as Chingleput and South Arcot, there are only about half a dozen firms fabricating implements.

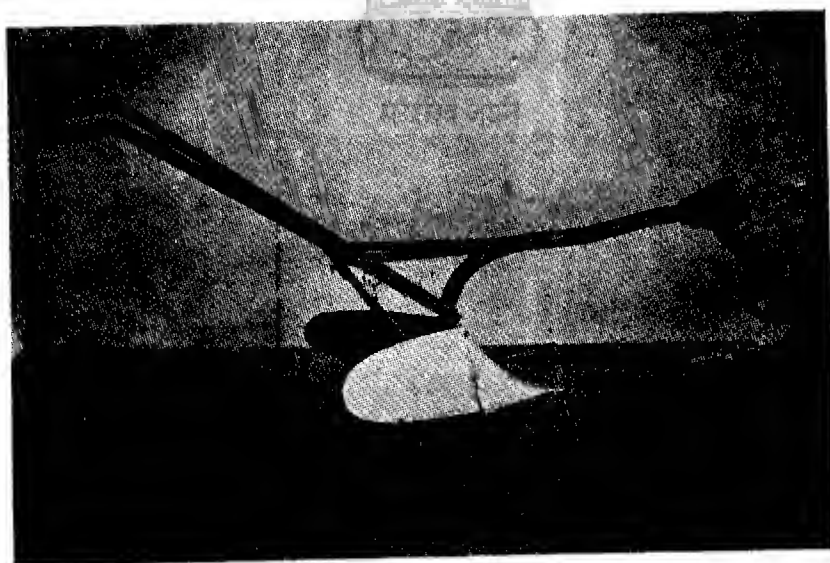
*5.2. Categorisation of agencies fabricating agricultural implements.—*The Team noticed that most of the approved fabricators have taken up the manufacture of handtools like crow bars, spades, hoes, pick axes, sickles, etc., and such equipment as mhots, their buckets, sugarcane pans, etc. There are very few fabricators who have actually taken up the manufacture of improved agricultural implements such as ploughs, drills, cultivators, etc. There appears to be an urgent need of carrying out a careful survey of the agencies engaged in the manufacture of implements with reference to their capacity and suitability. The Team considers that while some of the manufacturing firms deserve every encouragement, others require to be weaned out. Further, it will be desirable to categorise the manufacturers into two classes : (a) those primarily engaged in the manufacture and repair of indigenous implements and handtools which are common in use; and (b) those mostly fabricating improved and new implements, like furrow turning ploughs, drills, harrows, etc. While it will be desirable to ensure supply of adequate material to all fabricators, it is the latter class which must receive special attention and priority. During the process of sifting, a number of fabricators are likely to be eliminated which will result in making available larger quantity of iron and steel for those left in the field.

*5.3. Selection of fabricators.—*The selection of fabricators must be made with great care as the manufacture of implements requires considerable skill and technical know-how. The financial position of fabricators and their workshop facilities deserve special consideration. The demand for implements, in most cases, is seasonal which at times puts considerable financial strain on manufacturers. It will also be worthwhile to encourage specialization amongst the fabricators. For instance, some of them may take up the manufacture of ploughs and other important tillage implements, while others may go in for plant protection equipment like sprayers, dusters, etc. This will facilitate standardization of implements and enforcement of quality control. With the rise in production, it should also be possible to bring down the prices.

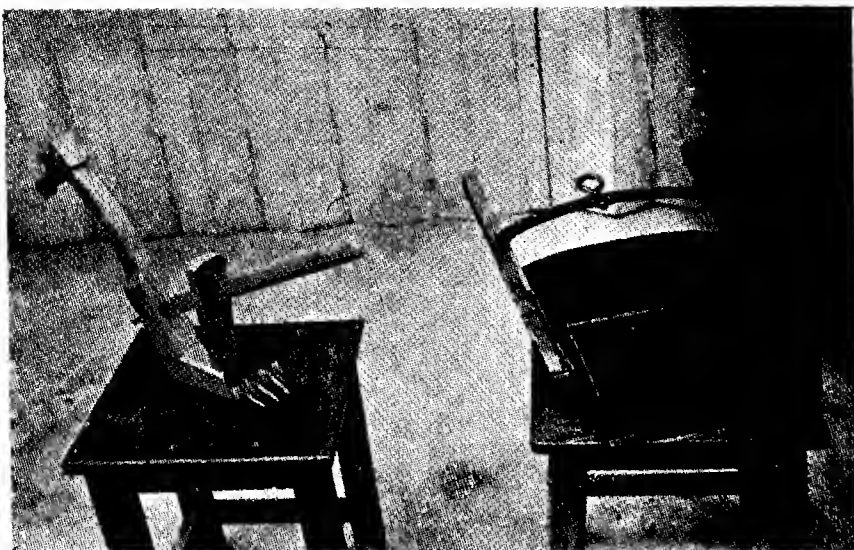
*5.4. Establishment of Cooperative Manufacturing Units.—*The Registrar, Cooperative Societies, Madras, reported that only a few Cooperative Societies had undertaken the manufacture of implements as raw material was not available in sufficient quantity. More societies could take up this work if iron and steel was made available. It is, however, evident that the Department has not yet chalked out any concrete programme for



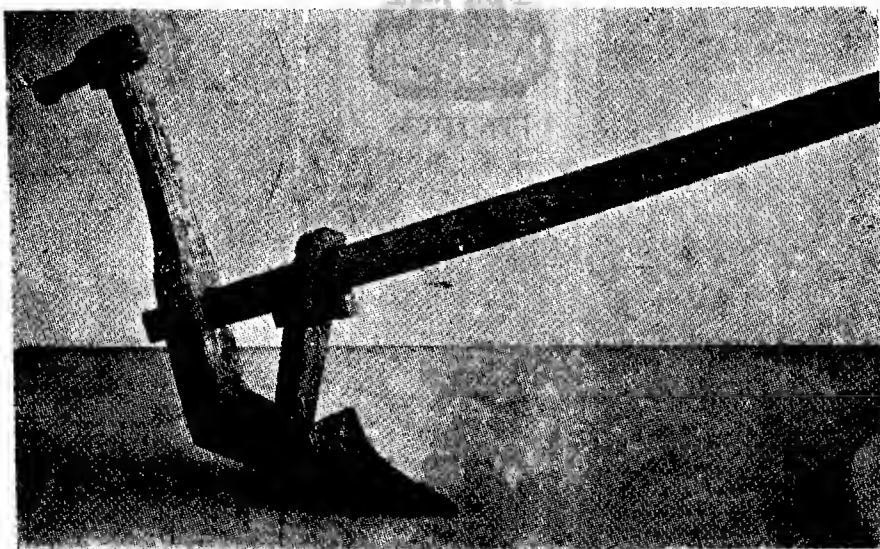
Bund Former



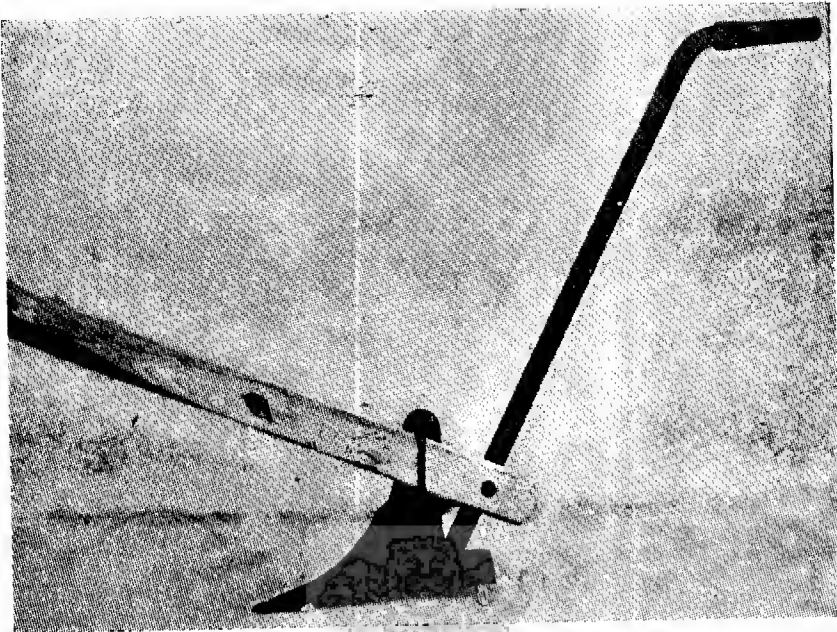
Ridge Plough



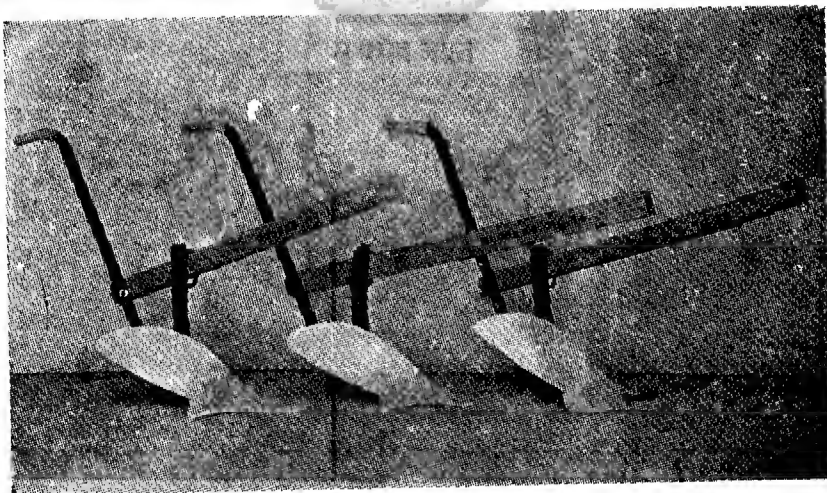
Models:—1. Melur Plough 2. Buck Scraper



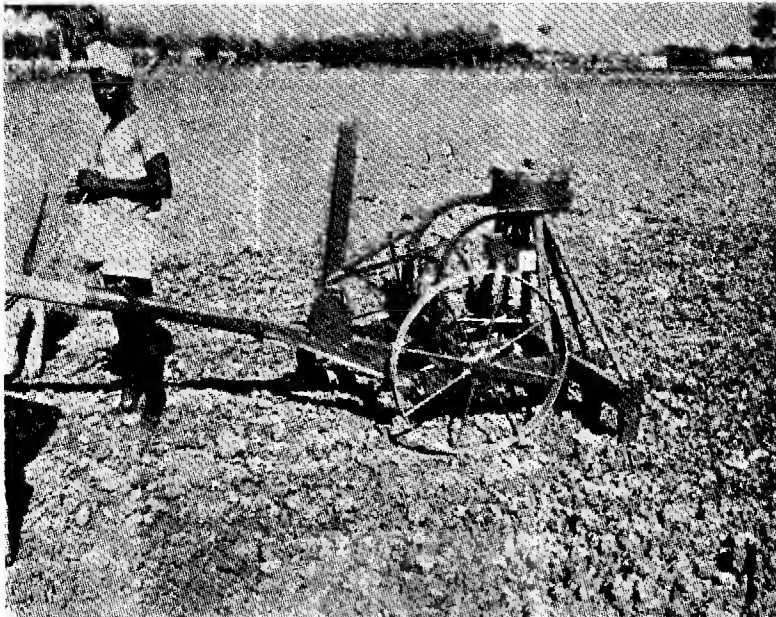
Melur Plough or Bose Plough



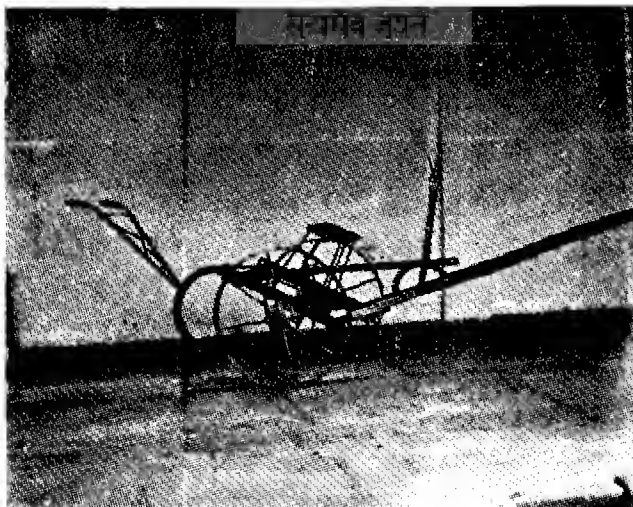
Mould Board Plough P.S.G. No. 6



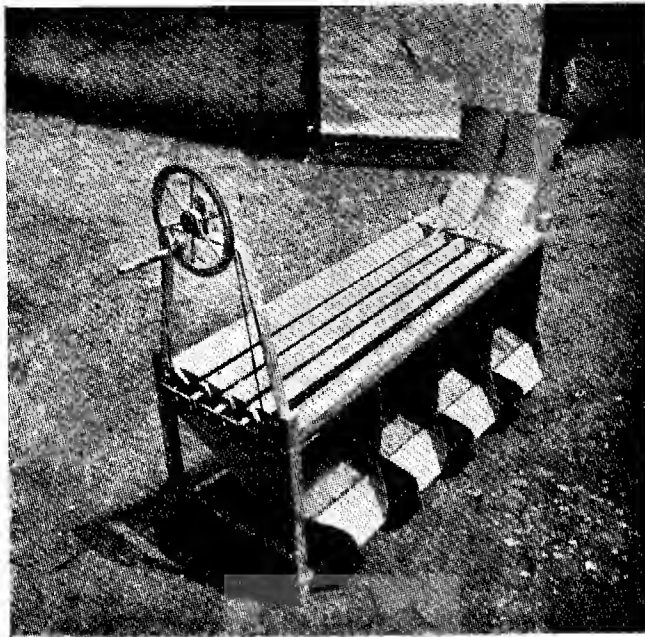
Mould Board Ploughs:—1, Kirloskar 14 2, Cooper 11 3. P.S.G. No. 16



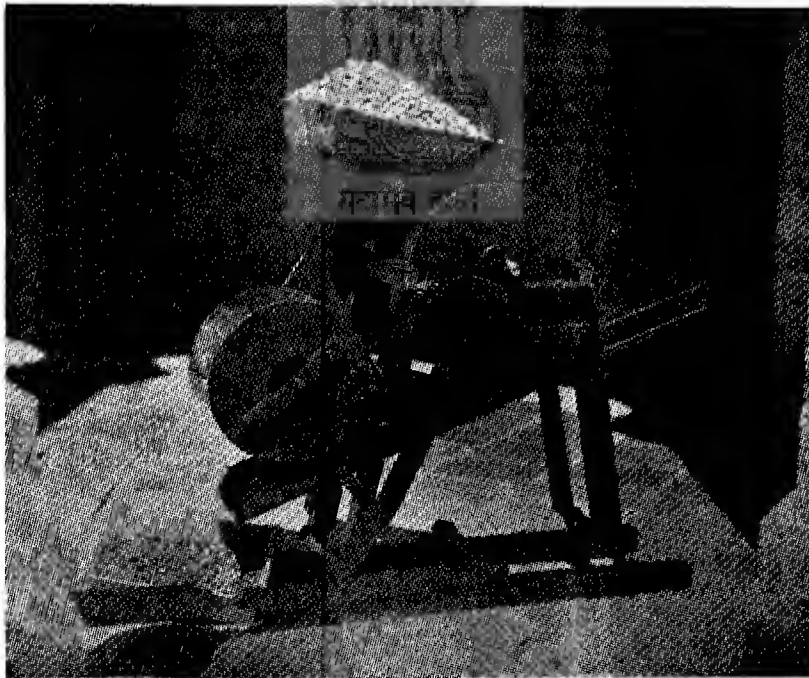
R. E. Mechanical Seed Drill



Bullock Drawn Groundnut Harvester



Hand Operated Groundnut Grading Machine



Pedal Operated Groundnut Decorticator

the manufacture of implements. The Team is of the opinion that the utilisation of Cooperatives in the manufacture of agricultural implements deserves greater attention and in order to achieve it, it will be desirable to draw a definite programme jointly by the Department of Agriculture and Registrar, Cooperative Societies.

5.5. *State Manufacturing Programme.*—The manufacturing programme, at present, is only limited to the supply of implements under special schemes financed by various Departments. Detailed programme for bringing about large-scale use of improved implements and tools in the State has not yet been worked out. Broadly speaking, the problem can be split up as follows:—

- (a) Manufacture of tractors and power implements and machinery such as oil engines, pumping sets, electric motors, power sprayers and dusting machines, power threshers, dryers, etc.
- (b) Manufacture of bullock-drawn implements like Wet-land Puddlers, Burmese Setton, Bund Formers, Scrapers, Seed Drills, Cultivators and some improved Mould-board Ploughs of heavy, medium and light size.
- (c) Manufacture of vital parts, like plough shares, discs, shares, etc., on a mass scale.
- (d) Manufacture of indigenous implements, their repairs and replacements.

The programme for each class of these implements will have to be drawn up taking into consideration the facilities available for production.

In order to ensure standardisation of the implements and their spare parts, the Team recommends that some of the experienced and well-to-do manufacturers should be encouraged to equip their workshops with modern machines and take up the manufacture of standard implements on a mass scale. These implements should then be supplied to local fabricators for assembling and distribution. In fact, under such an arrangement it should be quite easy to bring in the village artisans. It should be possible for them, after receiving short training, to assemble, fit and adjust these implements in the village.

5.6. *Mass-scale manufacture of vital parts by Government workshops.*—The Team considers that the manufacture of some vital parts of important implements such as plough shares, discs, blades, etc., which require high quality steel could best be manufactured by the State workshops. These parts must conform to standard designs and specifications so that they could be fitted into the implements concerned without any difficulty. They must also bear hall-mark of the Department and should be made available in sufficient number to the fabricators in the State who should

be allotted iron only for the manufacture of other parts of implements. Under the different schemes of affording subsidies to the cultivators, only those implements should be distributed which are fitted with vital parts manufactured and supplied by the Department of Agriculture. It is suggested that to start with, one of the State's workshops under the Department of Agriculture may be equipped to take up this programme. With coordination between the public sector and private sector, the manufacture of implements, besides receiving a strong fillip, is bound to bring about marked improvement in their quality, efficiency and durability. The chances for misuse of iron by the fabricators are also likely to be minimised.

5.7. *Price Fixation.*—At present, the prices of the agricultural implements are not fixed by the Department of Agriculture. As such, they vary considerably from place to place and fabricator to fabricator. At a number of places, this fact was brought to the notice of the Team. It seems necessary that the prices of the implements manufactured by the fabricators should be fixed taking into account the cost of raw materials and other items of expenditure. Care has, however, to be taken to keep these prices as uniform as possible and in no case they should vary from fabricator to fabricator in the same place.

5.8. *Procedure for bringing the implements on the approved list.*—At present, there is a great variation in the design of the same implements from district to district, there being no standard design. The shape and size of different parts of the implements also vary from workshop to workshop, depending upon the manufacturing system and availability of equipment. While at some places, some parts like side-plates, mould-boards of ploughs are produced out of cast iron by moulding it, at others, they are being manufactured out of the soft iron plates. In order to improve this position, it is necessary that the designs of the implements must be standardized. The blue prints and prototypes should be prepared and supplied to the manufacturers by the Department of Agriculture. Before this is done, implements on the approved list should be thoroughly tested and approved by a Special Committee which may consist of the Joint Director (Agricultural Engineering), Research Engineer (Research Testing and Training Centre), Agricultural Engineer (Inspection), Regional Deputy Directors of Agriculture, Agronomist and a few progressive farmers. The implements approved by this Committee should then be thoroughly tested in the region, for which they are recommended, by a number of farmers and at State Government farms before their manufacturing starts.

5.9. *Quality Marking.*—To ensure the quality of the implements manufactured by various agencies, it is necessary that arrangement should be

made for the inspection and marking of implements. Implements and their component parts must conform to a prescribed standard. The availability, interchangeability and ease with which spare parts can be fitted to the agricultural implements is of special importance in the popularisation of implements. Since the Department has a number of Engineers working under various schemes in different districts, it should be possible to evolve a workable system by appointing small additional staff.

5.9.1. In the case of industrial units, the officers incharge are responsible for the manufacturing programme and the design of implements is frequently changed by them in consultation with the local District Agricultural Officers. The Team noticed that in a number of cases, the designs and shapes of implements manufactured were quite different from the standard designs of the Department. This is not a satisfactory state of affairs and it seems necessary to exercise control on the quality of implements manufactured by these units by an agency other than that of the production unit. It is suggested that one of the Assistant Engineers in the District assisted by the staff proposed to be appointed under Quality Marking Scheme in paragraph 5.9, should be authorised to exercise control on the standard of implements manufactured by the industrial units. Before these implements are actually supplied or sold, they must be inspected and marked.

5.10.—*Standard Blue Prints for important implements.*—The Indian Standard Institution has drawn up standard blue prints for a number of agricultural implements such as paddy weeder (rotary type), forks, garden rakes, hedge shears, pruning knives, etc. It is necessary that such standards must be laid down for all the important improved agricultural implements manufactured in the State. The Team has accordingly, in consultation with the Research Engineer, Research Testing and Training Centre, Coimbatore, prepared the blue prints of some important implements which are given in Annexure V. The schedules of iron and steel requirements for these implements have also been worked out which are given in Annexure VI. It will be desirable for the State Government to publish these specifications in the form of leaflets for distribution among the fabricators so that they may use only that much of iron for different parts of implements, as is essential. Simple leaflets in local languages may also be printed for the use of village blacksmiths and information of progressive cultivators.

CHAPTER VI

DISTRIBUTION

6.1. In Madras State, the pattern of organisation engaged in the distribution of agricultural implements is similar to that of the Punjab and other States. Most of the implements are sold by the private fabricators, either directly or through their commission agents. The implements which are manufactured by the fabricators and Industrial Units, under some official schemes or to meet the requirements of extension agencies in the C.D. Blocks, are distributed either by the Director of Agriculture and/or by the Panchayat Commissioner (Block Development Officer) of the Department of Rural Development and Panchayats. The Director of Agriculture purchases implements like Melur Plough and Mould Board Ploughs under a special scheme from the Industrial Manufacturing Units and private fabricators in the ratio of 3:1. Cooperative Societies engaged in the manufacture of implements are included in the category of private manufacturers. As regards the supply of implements under the Block Schemes such as paddy weeders, hoes, puddlers, scrapers, green manure trawlers, etc., the Panchayat Commissioners (BDOs) place the order directly on the firms and then distribute the implements through their extension staff.

6.2. *Sales through Cooperative Societies.*—While the major role in regard to making arrangement for the supply and distribution of agricultural implements is played by the extension agencies, their actual sale is done by the Service Cooperative Societies. The State has a net-work of Service Societies practically in every district. Of these, 90 societies are engaged in the distribution of implements. The Team noticed that some of the Cooperative Societies are showing considerable interest in this work but most of them are, at present, functioning as agents of the extension agencies. They must be enthused to take up this work as a service to the members and not just for profits.

6.3. *Utilization of extension workers for distribution.*—Some of the implements which are being distributed under official schemes such as power sprayers, etc., are also stocked with the village level workers for distribution amongst the cultivators. This is not in conformity with the accepted policy of reducing the burden of Extension Officers in regard to the handling of non-technical work.

6.4. *Private Traders.*—In so far as the sale of power implements and machinery is concerned, not much difficulty is felt as the firms dealing in them have got their own sales organisations for demonstration and supply to the cultivators. Moreover, the Department calls tenders from various firms for the distribution of such items as oil engines, electric motors, power sprayers, tractors, etc. Usually, lowest tenders are accepted taking into consideration the efficiency and quality of implements. It is only in regard to the bullock-drawn implements that the difficulties are felt with regard to their sale. Even for some of the ploughs which have been in use in the State for a fairly long time and seem to be quite popular amongst the cultivators, the sales take place mostly through the official agencies. The Industrial Manufacturing Units also depend on the Extension Officers to get their implements distributed. In fact, they manufacture them only on the receipt of orders otherwise they remain engaged in manufacturing industrial goods. At times, the Industrial Units despatch the implements in an unassembled condition and different parts are sent in several lots which results not only in wastage of time but also creating problems for the extension agencies for assembling parts into a finished product before supplying them to the cultivators. The Team is of the opinion that it will be desirable for the Industrial Units to draw up their own regular programme of implements manufacture in consultation with the extension organisations and make arrangements for direct sale of the implements to the cultivators by appointing their own retail sellers as is being done by the dealers in power implements.

6.5. *Prices.*—During discussion with the cultivators in one of the villages of Coimbatore, it was pointed out to the Team that the prices of implements distributed by the Department of Agriculture were higher than those of similar implements available in the open market. The officers of the Department concurred with this view and stated that it was mainly because of higher manufacturing cost of the industrial units. The other defect brought out in respect of the manufacture and distribution system was non-standardisation of implements and their parts which presents a good deal of difficulty in carrying out repairs, as at times, different parts of the implements received from different sources do not fit into each other. The non-availability of trained artisans for the repair and adjustment of implements was yet another reason put forth for the slow progress in the distribution of implements. Unless these defects are removed the sales are bound to remain low.

6.6. *Progress of implements supply schemes.*—A pilot scheme for the distribution of improved iron ploughs (Melur and Mould-Board) on a subsidised basis, has been functioning in the State since 1961-62. While the subsidy for the Melur plough is 25 per cent, that for mould-board plough is 33 1/3 per cent, subject to the maximum of Rs. 7 per plough. During 1961-62, the target fixed was 50,000 ploughs for five districts

but the actual achievement was 23,000 ploughs, as the scheme started functioning late in the year. In 1962-63, it was proposed to distribute 1,40,000 ploughs in the whole State, excluding Nilgiris and Kanyakumari districts. The scheme has been extended to all the districts in the current year and the target now is 1,85,000 ploughs.

6.6.1. In addition to improved ploughs, sprayers and dusters are being supplied to the cultivators at 50 per cent cost. This distribution has been entrusted to the Panchayat Unions with effect from the 1st October, 1961. During 1961-62, 3,824 sprayers and 430 dusters were supplied to the ryots. The target for 1962-63 was 3,202 sprayers and 1,279 dusters. In 1963-64, it is envisaged to distribute 3,000 sprayers and 1,200 dusters. The Department of Agriculture is also running a number of hire-purchase schemes such as supply of multi-purpose Universal Otto Frames, oil engines and electric motors. During 1961-62, 19 Otto Frames were distributed, the targets for 1962-63 and 1963-64 was 32 and 50 respectively. As for lift-irrigation schemes, provision is made in the Third Plan for the supply of 7,200 electric motor pump-sets and 1,240 oil engines pump-sets.



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CHAPTER VII

TRAINING

7.1. In the State, the cultivators owning power implements like tractors, pumping sets, oil engines, power sprayers, etc., are acquainted with their use and functions. The firms engaged in the sale of such machinery make arrangements for their training at the time of the sale of these implements. Later on, off and on, special courses are organised by them to make the farmers learn their handling and working fully. In regard to the bullock-drawn implements, the position is not satisfactory. In handling them, the extension staff is supposed to give the training but in actual practice considerable difficulty is, at times, felt in carrying out the repairs and adjustments, as the facilities available locally are far from satisfactory. Unless, the village artisans are able to carry out minor repairs and adjustments in these implements, though it will be desirable if they are able to manufacture simple type of implements and handtools and other parts locally, the difficulty is likely to continue.

7.2. *Training at workshop wings.*—With a view to imparting training to the village level workers in the use and handling and the village artisans in the repair and manufacture of implements, the Directorate of Extension, Ministry of Food and Agriculture, has established workshop wings at three out of four Rural Extension Training Centres in Madras State viz., Bhawanisagar, S. V. Nagaram and Pattukottai. Detailed objectives of these centres are:

- (a) to train village artisans in the manufacture and repair of improved agricultural implements recommended by the Department of Agriculture in the area;
- (b) to train village artisans in making improved hand tools for the cultivators and improved workshop equipments and tools for themselves;
- (c) to develop implements suited to the locality in which the workshop has been established;
- (d) to test and modify some of the implements obtained from other States and countries; and
- (e) to teach the village level workers in the use and maintenance of improved agricultural implements.

The duration of the course of training for the artisans is one year. At each centre, 20 boys are trained yearly, each trainee being given a

stipend of Rs. 50 per month. Recently, another pilot scheme for job-orientation training has been started at these centres. The Team studied the working of the Centre in Coimbatore district in detail and it was found that most of the trainees who had passed out from the Centre, had not taken the job of repairing of agricultural implements. The Centre did not have complete information in regard to the whereabouts of the trainees. Discussions with the trainees showed that they were mostly job seekers and that many of them had been attracted to the Centre by the stipend. The workshop is also neither properly equipped nor adequately staffed to train the village artisans. The Team was informed that there was no keen competition for this course amongst the candidates. The usual procedure is that the names of the prospective candidates are recommended by the Village Level Workers to Block Development Officers, who in turn send them to the Principal of the Training Centre. Although selection is finally made by a Committee at the Centre but since very few candidates turn up, the choice is limited. We are, therefore, of the opinion that the scope and functions of the workshop wings may be restricted only to the training of Village Level Workers in the use of improved agricultural implements recommended by the Department of Agriculture.

7.3. Training of village artisans.—In Madras, fortunately some well-established Industrial Units are functioning where manufacture of implements has been taken up. The Team considers that it will be more useful if arrangements for the training of village artisans are made at these units rather than at the workshop wings of the Rural Extension Centres. Instead of paying a stipend, it should be possible for the Industrial Units to pay them regular wages and utilize the available funds for the purpose of providing them a set of tools.

7.4. In-service training to Extension Staff.—One of the objectives of the Research Testing and Training Centre started at Coimbatore is to impart in-service training to the Extension Officers, in the use and handling of implements. So far, this programme has not been taken up. It will be desirable to work out a phased programme for it. The Team, however, is of the opinion that it may be very difficult for this Centre to undertake a large-scale programme of training for all the extension workers in the State, unless the Research Engineer is provided with a separate staff for this purpose. Under these circumstances, it is suggested that this Centre may be utilised only for the training of District Agricultural Officers and Assistant Engineers, at present, engaged in the distribution of pumping sets, soil conservation, tractor schemes, etc. They should in turn organise regular in-service training courses at the workshop wings of the Extension Training Centres and at some of the Government Agricultural Farms, for the agricultural extension officers, village level workers and the farmers.

CHAPTER VIII

EXTENSION

8.1. *Demonstration.*—The ultimate objective of all agricultural research, including that in agricultural engineering, is to raise farm efficiency. Thus, to carry results of research to farmers and their adoption in actual practice is as important as research itself. In the extension programme, the most difficult part is that of convincing cultivators of the advantages and usefulness of new findings over the practices already in vogue. For this purpose, a number of methods have been adopted, out of which practical demonstration is best suited to our local conditions. Accordingly, this method has been extensively followed in Madras in the introduction and popularisation of new varieties, new crops, new fertilizers, control of insect-pests and diseases, etc. For the demonstration of new implements and hand tools, however, it appears that the programme is not so well organised as in other cases.

8.2. *Demonstration Records.*—During discussion with the State Officers of the Agriculture Department, it transpired that most of the demonstrations laid out were of composite i.e. package type, the use of improved agricultural implements being one of the items of demonstration. The position, at present, is that when demonstration plot is laid for fertilisers or other approved practices, the use of improved implements such as mould-board ploughs, harrows or hoes for inter-culture is also made. The number of demonstrations is then recorded separately for each item.

8.2.1. District Agricultural Officers who had replied to our questionnaire, have given the following figures for demonstration of implements in their districts:

S. No.	Name of District	Number of demonstrations		
		1960-61	1961-62	1962-63
1	North Arcot	491	560	552
2	Thanjavur	300	600	510
3	South Arcot	2,620	2,720	3,160
4	Tirunelveli	300	300	300
5	Salem	..	..	2,000

Nowhere in the State, special demonstration plots have been laid to find out purely the increase or additional production or saving in the labour through the use of improved agricultural implements only. The composite type of demonstration is no doubt good but we are of the opinion that the single-purpose demonstration is also necessary for convincing the farmer of the economy and efficiency of a specific process of Agriculture.

8.3. *Case Study of Demonstrations.*—From the study of records made available at the block level, the Team came to the conclusion that no detailed plan for specific type of implement had been drawn up. The demonstration registers in most of the cases were incomplete. Even the list of implements to be demonstrated in the block area was not readily available. A study of four random villages in the districts of Coimbatore, Kanyakumari and Tiruchirappalli showed that out of the four villages, no demonstrations were held in two villages in 1960-61 and 1961-62 and in the remaining two villages, two demonstrations in 1960-61 and four in 1961-62 were carried out. The present position of districts, blocks and villages studied is given in the following table:

S. No.	Name of the village & district.	Total number of demonstrations held in the last three years and its break-up.								
		District			Block			Village		
		60-61	61-62	62-63	60-61	61-62	62-63	60-61	61-62	62-63
1	Village Manikanda, Distt Tiruchirappalli (Nachikurichi)	..	..	..	27	30	31	2	4	3
2	Vilpatti (Madurai)	..	..	..	..	..	92	..	..	16
3	Terur (Kanyakumari)	832	1,255	706	141	243	77	..	..	..
4	Tondamuthur (Coimbatore)	..	1,794	946	199	269	242	17	29	27

It will be seen that district records of demonstration were not available for the years 1960-61 to 1962-63 in the districts of Madurai and Tiruchirappalli. No information in respect of demonstrations for the years 1960-61 and 1961-62 could be had at Madurai even at the Block headquarters. In villages, where the demonstration record was kept, details of each type of implements were not forthcoming. The entire system of planning and laying-out of demonstrations of implements requires to be reviewed. The Team, therefore, recommends that:

- (a) specific instructions should be issued for laying out a definite number of demonstrations in each block and each village level worker's circle for each type of implement, approved by the Department of Agriculture;

- (b) the demonstration of implements should form an integral part of the village plans; and
- (c) record of demonstration should be separately maintained for each implement at various levels.

8.4. *Special Staff for Demonstration.*—At present, village level workers and extension officers (Agriculture) are looking after the demonstration programme. In the current year, a post of Agricultural Supervisor has been sanctioned for each district for the popularisation and demonstration of agricultural implements. Upto the time of the Team's visit in June, 1963, no orders had been received by the Department of Agriculture for the appointment of these supervisors. The Team have doubts with regard to the utility of one supervisor in the whole district. In the context of present administrative set-up, demonstration of implements has, by and large, to be done by the village level workers and agricultural extension officers, as they are the persons who come in direct contact with the cultivators and are familiar with the local conditions. One single person in a district cannot be expected to make much impact. He can, at the most, be of some help only to the District Agriculture Officer in putting pressure on the local agriculture officers in carrying out these demonstrations, collecting and compiling records of demonstrations and arranging shows. It should be possible for the normal staff of the Department to attend to these functions. Further, it is our feeling that the demonstration of agricultural implements can best be done by experienced persons with knowledge of agriculture and who have also received proper training in handling and use of implements. In the Punjab, where demonstrators qualified only in agricultural engineering were appointed for this purpose, the scheme has not proved of much use. The Team, therefore, recommends that for the introduction and popularisation of new implements and tools, services of the existing extension agencies may be utilized and for that purpose, regular in-service training courses should be arranged at all important centres in the State.

8.5. *Demonstration Sets.*—A set of implements consisting of hand-sprayer, hand-duster, iron plough, melur plough, rotary weeder, is kept at the headquarters of each village level worker. The number and category of these implements can be changed by the Panchayat Union with approval of the District Agricultural Officers. At the block level, power sprayers, hand-operated dusters and sprayers, universal otto-frame, iron plough, seed treating drums and other implements, approved by the District Agricultural Officers, are also kept. In addition to these, each Panchayat has at least one hand-operated sprayer and one mould-board plough for demonstration or for hire to ryots. The Team found that at most of the places, implements had remained in stores and not much use of them had been made. The Team, therefore, is of the opinion

that working of this scheme requires thorough examination and only such implements may be kept at different levels as are absolutely necessary and for which adequate arrangement exists for demonstration and of which there is keen demand. At the Panchayat level, there is no trained person who can properly handle the implements and demonstrate their working to cultivators. Further, as there is keen demand for power tillers and machinery, it seems desirable that to start with they may also be included in the set of implements kept at the district level for demonstration purposes.

8.6. *Lending Implements to Cultivators.*—A system of lending implements to cultivators by the Panchayat Unions is in vogue in this State. For each implement, a small charge on account of maintenance and repair is made. It was represented to the Team by some farmers that only those implements which cost Rs. 25/- or more may be kept by the Panchayat Unions and they should be given free of cost. There is much force in this argument as popularisation of new implements is a difficult process. The Team, therefore, recommends that no charge should be made for the implements lent to the cultivators for demonstration purposes. It is, therefore, suggested that small implements which have already become quite popular with the cultivators need not be kept at various centres for demonstration purposes.

8.7. *Demonstration Farms.*—On some Government seed and demonstration farms, it is desirable to have power tillers and small tractors with necessary implements. Besides their use on the farm, arrangements should be made to demonstrate them to the cultivators of the surrounding areas. It will also be advantageous if meetings of progressive farmers are especially arranged on the farms for demonstration purposes.

8.8. *Agricultural Shows.*—In agricultural exhibitions, namely cattle fairs and shows, it will be desirable to exhibit important implements suited to local conditions. Some space should also be reserved at important markets of agricultural commodities where new implements may be put up for exhibition. It will also be useful if simple leaflets in local language giving briefly the use, economics, methods of handling, availability of implements, their spare parts and prices are distributed amongst the visitors. All the prizes at the cattle shows and other occasions may be given in the form of agricultural implements.

8.9. *Short Courses.*—We have already recommended that training courses should be organised at the Research Testing and Training Centre. It will be useful if proper plan is drawn up for the training of various categories of Government officials and farmers. While refresher courses may be organised for the Assistant Engineers and the District Agricultural Officers at the Research Testing and Training Centre, the Agricultural Extension Officers, the Village Level Workers and growers

may be trained at the workshop wings of Extension Training Centres and Agricultural Farms.

8.10. *Non-Official Agencies.*—The State is already making increasing use of Panchayat Unions in promoting the use of improved agricultural implements amongst the cultivators. The other non-official agencies which could be made use of for this purpose are: (a) Fabricators of improved implements; (b) Farmers' Forum. Some of the fabricators are already popularising the sale of their products by putting up shows and demonstrating their use on important occasions but their number is very small. It should be possible for important fabricators to combine their production programme with the training of village artisans and thereby use the latter for introducing and promoting the sales of their implements. The Farmers' Forum, through their local representatives, could also play an important part in this work.



सत्यमेव जयते

CHAPTER IX

CREDIT FACILITIES

9.1. *Need for Credit.*—One of the main problems which has to be faced in popularising the use of improved implements and agricultural machinery, is that of finance. Most farmers do not usually have enough financial resources for buying improved type of implements even when they are comparatively inexpensive. The use of agricultural implements and tools is likely to expand rapidly if adequate credit facilities are made available to them. Because of the seasonal nature of farm operations and big variations in prices of different types of implements and machinery, credit is required for short, medium and long periods. While for the purchase of low-priced simple implements and tools, short-term loans for a period of about a year should be sufficient, for costly machinery and implements, long-term loans are necessary. For some of the bullock-drawn tillage implements, only medium-term loans will be required.

9.2. *Credit Agencies.*—There are three agencies in the State which lend money to the farmers namely the Revenue Department; the Co-operative Department; and the Agriculture Department. The Revenue Department grants loans to the agriculturists for the purchase of agricultural implements, carts, irrigation pumps and the like under the Agriculturists Loans Act, 1884. Cooperative Societies issue short-term and medium-term loans for the purchase of agricultural implements, machinery and transport equipment. Mostly these loans are given in cash but sometime they are advanced in kind in the form of implements but they are so much inter-mixed with other purposes loans that the amount advanced for implements and machinery is not separately known. The Team feels that in the crop production loan plans, adequate provision should be made separately for agricultural implements and machinery.

9.2.1. *Agriculture Department.*—Loans, for the purchase of agricultural implements and machinery are disbursed by the Agriculture Department under the following programmes:

- (a) Medium-term loans for lift-irrigation schemes such as installation of oil engines, electric motor pump-sets and filter point tube wells;

(b) Loans for the promotion of mechanized cultivation, such as hire charges of tractors and bull-dozers engaged for land reclamation; and

(c) Long-term loans for the purchase of tractors and implements.

The total provision made for various schemes in the Third Plan is given below, alongwith actual expenditure in 1960-61, revised estimates for 1962-63 and budget estimates for 1963-64 :

(In lakh rupees)

S. No.	Name of Scheme	Actuals 1961-62	Revised Estimates 1962-63	Budget Estimates 1963-64	Third Plan Provision
1	Pumpset hire purchase scheme	20.98	17.40	22.16	100.00
2	Tractor hire purchase scheme	6.67	12.06	10.06	50.00
3	Filter point scheme	15.09	7.19	4.82	50.00
4	Scheme for hire purchase of universal otto frames under improved implements	0.01	0.75	0.75	N.A.

Under the first scheme, oil engines and electric motors, in complete sets, are supplied to ryots on easy instalment-repayment. The cost of equipment with interest and handling charges, etc., is recovered in 3.7 annual instalments, depending upon its value. In the case of tractor hire-purchase scheme, the maximum financial limit is Rs. 20,000/- per ryot. The total cost of the tractor together with interest, taxes, etc., is recovered in seven annual instalments. Under the third scheme, pumping sets, of a maximum cost of Rs. 3,000/- are supplied on hire-purchase basis to encourage the cultivation of paddy, cotton and groundnut in suitable areas. Farmers are also helped for the purchase of Universal Otto Frames by loans at the rate of Rs. 1,000/- per set.

9.3. *Subsidies*.—In addition to loans, the Department of Agriculture also distributes some implements on subsidised basis, as shown below:

(In lakh rupees)

S. No.	Name of Scheme	Actuals 1961-62	Revised Estimates 1962-63	Budget Estimates 1963-64	Remarks
1.	Improved Agricultural Implements	0.50	6.59	6.59	All sub-sidy.
2.	Plant Protection	21.49	14.27	16.32	Only part of it is subsidy.
3.	Arccanut Development	0.05	0.49	0.63	..

For the year 1963-64, a sum of Rs. 6,59,000 has been provided for the distribution of Melur ploughs and shares on 25 per cent subsidy,

and Mould Board ploughs on 33 1/3 per cent subsidy, subject to a maximum of Rs. 7/- per plough in both cases. During the year 1961-62, 23,000 ploughs were distributed. In the current year, it is proposed to distribute 1,85,000 ploughs. The rate of subsidy in the case of plant protection equipment *viz.*, sprayers and dusters, is 50 per cent. The scheme has already come into operation through the Panchayat Unions with effect from the 1st October, 1961, and in the current year, it is proposed to distribute 3,000 sprayers and 1,200 dusters. The financial provision for these is made in the grant of Rs. 7,500/- payable to the Panchayat Unions for agricultural implements. Plant protection measures on arecanut crops are being encouraged by giving 50 per cent of the cost of high-power sprayers as subsidy.

9.4. *Full Finance Scheme.*—The Cooperative Department has launched a scheme to meet the entire credit needs of the villagers by way of short-term and medium-term loans to the exclusion of other agencies. The scheme was started as an experimental measure in the Srivilliputtur Firka of the Ramnathapuram District in December, 1956 and Erode Firka of Coimbatore District in February, 1957. As the results of the working of this scheme in these two areas are very encouraging, this scheme has been extended to other areas and by 1960, the scheme was working in selected areas of all districts of the State. The scheme is operating through the agency of Agricultural Banks and Small-sized Societies in the respective areas. As the scheme is intended to supply full credit requirements of agriculturists, no *taccavi* loans are being granted in these areas.

9.5. *Channelising credit through one agency.*—The bulk of agricultural loans being distributed through the Cooperative Societies, the quantum of agricultural credit available through other agencies is becoming smaller. This is indeed a very encouraging feature. In the policy statement issued in November, 1958, by the National Development Council, Cooperative Societies and Village Panchayats, are called upon to play a leading role for the social and economic development at the village level. In fact, Cooperatives are the only agencies which can make available credit to the cultivators on reasonable terms. The significant feature is that the State has launched a comprehensive scheme for bringing into the Cooperative fold not only all the villages but also large sections of farmers to increase agricultural production. The idea is to ensure the availability of necessary supplies such as implements, seeds, manures, etc., needed for better farming to all farmers and meet their cent per cent credit requirements by the end of the Third Five Year Plan. The Team greatly appreciates the steps taken by the State Government. The Village Cooperatives are the only agencies which can successfully and satisfactorily undertake the distribution of short-term and medium-term loans. Granting of *taccavies* and distribution of such loans by the block agencies should be stopped where cooperatives have successfully taken up this work.

CHAPTER X

ECONOMICS OF IMPROVED IMPLEMENTS AND SCOPE OF POWER MACHINERY

10.1. *Tillage Experiments.*—The main objectives of introducing improved agricultural implements and machinery are:

- (a) to increase production and/or minimize losses by enabling the farmer to perform agricultural operations in time and properly;
- (b) to cut down labour costs and thereby raise farm incomes; and
- (c) to make farming easier and more attractive.

To what extent, improved agricultural implements are instrumental in raising production, has not been specifically established by any systematic research although a number of experiments in respect of depth, number and time of ploughing, different cultural practices of preparing land, summer ploughing, puddling, etc., have been carried out, from time to time, at different Agricultural Research Stations in the State. The main conclusions of these experiments may briefly be summed up below :

- (a) Deep ploughing is unnecessary except to eradicate pernicious and deep-rooted weeds. Ploughing with iron plough to a depth of 4.5" in comparison with ploughing up to 2.3" with indigenous wooden plough gives 10–15 per cent extra yield;
- (b) For paddy puddling, ploughing up to 4.5" depth is quite sufficient and shallower ploughing is enough for *chulam*, *ragi* and cotton in Coimbatore conditions;
- (c) In clayey soils, variations in depth of ploughing, time of ploughing and kind of implements used, do not influence the yield;
- (d) In the case of paddy, summer ploughing tends to depress the yield by 10–15 per cent under wet land heavy soil conditions and increase it by 25–30 per cent in the case of dry crops. Puddling gives an extra yield up to 50 per cent over non-puddled plots; and
- (e) In the case of dry lands, increase in number of tillage operations tends to increase the yield when the rainfall is high and well distributed but it does not seem to enhance the yield when the rainfall is low.

A detailed study of the experimental data from different research stations shows that in a number of cases, results obtained are contradictory to one another and it is not possible to make a definite recommendation on a particular aspect of tillage problem. The Team, therefore, recommends that a well-planned programme of research should be undertaken immediately, covering all tillage operations and implements necessary to produce soil tilth for optimum crop production and economics of various implements in relation to their productive capacity. It is also suggested that the usefulness of Melur and Mould-Board Ploughs which are, at present, being distributed throughout the State on subsidized basis under a Pilot Scheme, should be carefully examined in the light of results of experiments conducted at different farms and their use should be popularised only in areas where their utility is fully established.

10.1.1. Eradication of weeds is one of the primary objectives of the tillage and a systematic study of the intensity of weeds and their seasonal growth on soils with reference to moisture, may lead to better understanding of farm operations and the type of implements required under different agro-climatic conditions.

10.2. *Role of improved implements in saving man-power and bullock power.*—Of the three factors, land, labour and capital, contributing towards agricultural production, labour accounts for more than 50 per cent. Thus, in a country like ours, where there is scarcity of capital and land is expensive, one of the essentials of good farm management is the proper utilisation of labour. In the rural areas of Madras, statistics no doubt indicate that man power is not inadequate but the labour wages are steadily on the increase. This necessitates the introduction of labour-saving devices. One of the main advantages of Mould-Board Ploughs is that it does not leave any uncut portion between the adjacent furrows and one ploughing with it is, more or less, equivalent to 2.3 ploughings with the country plough. Similarly, a good deal of saving in time results with the use of other implements recommended in the State:

S. No.	Improved Implements	Proportional time required in comparison with indigenous implements
1.	Cultivators and Harrows	1/3 to 1/5
2.	Burmese Setton	1/2 to 1/3
3.	R. E. Seed Drill	1/3 to 1/4
4.	Japanese Hand Hoe for paddy weeding	1/6
5.	Turmeric Polisher	about 1/10
6.	Groundnut Decorticator	Do.

It is evident from the table above that cultivators and harrows take 1/3rd to 1/5th of the time taken by the country plough. The usefulness of these implements, when considered along with the context of the results of experiments on crop yield, is indeed very great. Similarly, Burmese Setrun which takes 1/2 to 1/3rd of the time required for the trampling of green manuring crop with the country plough, seems to have a great future. Weeding of paddy is fatiguing and time consuming operation. The Japanese Hand Hoe makes the work easier and increases the efficiency of the worker six times but its pre-requisite is that the paddy crop must be sown in lines. In the case of processing also, the time required for turmeric polishing, groundnut decortication and grading of potatoes is cut down considerably by the use of machine.

10.2.1. A study conducted by the Team on saving in man-power and bullock labour in individual crops shows that with the use of the implements recommended by the Department of Agriculture, considerable saving in manual and bullock labour can be brought about.

S. No.	Name of Crop.	Per acre labour requirement		Per acre labour requirements		Per acre Savings.	
		with indigenous implements.	with improved implements.	with indigenous implements.	with improved implements.		
		Man hours	Bullock pair hours	Man hours	Bullock pair hours	Man %age	Bullock %age
1. Paddy		812	158	556	106	256	31.5
2. Ragi		792	104	660	68	132	16.6
3. Groundnut		350	72	336	64	14	4.0
4. Cotton		540	56	412	52	128	23.7
5. Cumbu		512	96	314	53	198	38.7
6. Sugarcane		714	76	670	72	44	6.2
7. Cotton irrigated		842	72	572	74	270	32.1
8. Cholan		488	96	290	53	198	40.6

It will be observed that in the case of individual crops, saving in man-power varies from 4 per cent to 40.6 per cent and of bullock-power from 5.3 per cent to 44.3 per cent, (excepting irrigated cotton). In the case of such crops as paddy, *cholan* and *cumbu*, the saving in man-hours is as high as 31.5 per cent, 40.6 per cent and 38.7 per cent respectively. The saving in groundnut and sugarcane is low being only 4 per cent and 6.2 per cent respectively. This points out the need for devoting special attention to the evolution of improved implements for these crops. The introduction of power driven implements could bring about considerable saving both in manual and bullock labour.

10.3. *Use of Power Implements and Machinery.*—In view of the prevalence of small holdings, their sub-division and fragmentation, availability of generally cheap and abundant labour and limited means of the Ryots, it has been considered for long that there is not much scope for mechanisation of agriculture in Madras. For this reason, the Department of Agriculture has been concentrating its attention mainly on bullock-drawn implements. During the last decade, a number of cultivators have taken to the use of tractors and their number is increasing. But for the short supply, the number of tractors would have gone up much faster than at present. In view of the priority given by the State for the use of electricity for agricultural purposes, rural electrification has made rapid strides. Spectacular increase in the number of oil engines for pumping water has also taken place in areas where electricity has not so far reached. These facts clearly suggest that the problem of farm mechanization no longer brooks any delay in the developmental programme of agriculture in this State.

10.4. *Importance of timeliness of performing agricultural operations.*—In performing certain heavy agricultural operations like reclamation of culturable waste or weedy lands or clearance of jungle, bulldozing and levelling and soil conservation, it has been widely recognised that the heavy machines and tractors are necessary. It is only with regard to mechanisation of small agricultural holdings that opinions differ and many times doubts about scope and utility of mechanisation in general agriculture in India are expressed. As has already been mentioned, increasing use of power is being made by ryots in Madras, even where conditions cannot be said to be favourable for mechanisation. In agriculture, there are peak periods of labour requirements, when inspite of plentiful labour in the country, scarcity of labour is felt and wages go up. There is usually very little time between the harvesting of *Kuruwai* or *Kar* crops and the planting of *Thaladi* paddy in this State. In the main paddy areas of the State i.e. Thanjavur and Trichirappalli, the time for performing such operations as transplanting, weeding and harvesting of paddy, planted at different times, quite often overlap each other and there is heavy demand for labour at such occasions. Sometime, some wastage of crops occurs due to delayed harvest. Timeliness of performing various operations such as preparation of seed beds, sowing of crops, etc., in time, is that of paramount importance. If the sowing of crops is delayed even by a week or two, the yield is reduced by 10 to 20 per cent. Then, again at the harvest time, the crop has to be harvested, threshed, dried and gathered quickly to save it from rains and other natural hazards. In performing such operations, tractor and power machinery are very helpful. During the visit of the Team at a number of places, the cultivators pressed for the supply of tractors for ploughing their lands and preparation of seeds-beds for the transplanted rice.

10.5. *Scope for development of intensive agriculture with machanization.*—Madras has an equitable tropical climate with extensive irrigation system. These conditions are favourable for multiple cropping. Already, some farmers raise three crops of rice one after the other, in a year, on the same land. With such high intensity of cropping and introduction of labour-intensive crops, it should be possible to make use of the mechanical power and other labour-saving devices as well as of manual labour force to a large extent.

10.6. *Survey of mechanised farms.*—A recent survey of some mechanised farms in Coimbatore district, undertaken by the Madras State at the instance of the Indian Council of Agricultural Research, has clearly indicated that farm mechanisation has brought about remarkable progress at the farms. The main factors which are responsible for that progress are summed up below:

- (a) Increase in production per hour of work;
- (b) Increase in production per agricultural worker;
- (c) Reduction in bullock labour cost;
- (d) Reduction in labour requirements; and
- (e) Production of a variety of crops and increased intensity of cropping.

Mechanization means primarily replacement of bullock labour by mechanical power. In all the farms in the State, the saving in bullock hours was more than 96 per cent and in some cases, the farms were completely mechanised and no use of bullock labour was made. In regard to manual labour, the saving varied from 11.42 per cent to 64.7 per cent from farm to farm. Apart from reduction in the man and bullock days required for cultural operations, considerable saving took place in the time required for hauling and irrigation. The study indicated that there was all round improvement on the mechanised farms which resulted in increased measures of well-being of farming families and the society in general.

10.7. *Need for the formation of policy on farm mechanization.*—The results of this study are of great significance. It is apparant that under the present circumstances and in the context of trends in farming methods in India and abroad, farm mechanisation in the State can no longer be ignored. The paddy farms run by the Japanese cultivators at a few places in India have clearly brought out that power tillers and small machinery can bring about transformation in agricultural production. The Team, therefore, is of the opinion that the State Government should examine in detail the scope of mechanisation, formulate a definite policy and initiate concrete steps to implement that policy. A close study of the distribution of holdings in the State shows that there are more than one lakh owners

in the State holding 30 acres in terms of dry land or more. Although the number of such holdings is small yet the area owned by them forms a substantial part of the cultivated area in Madras. Since at present, the number of tractors in the State is only about 7,000, there seems every possibility of many more farmers going in for tractors. Even in the case of small farmers, it should be possible to make use of the tractors and farm machinery on a joint basis. Some of the well-to-do cultivators, Co-operative Societies and Panchayats could purchase tractors and other machinery and then hire them out to the cultivators. In one of the villages near Coimbatore, it was observed by the Team that a few persons had purchased power threshers and practically all the cultivators in the village were making use of them. This also indicates great possibility of introducing this practice elsewhere. It is, therefore, suggested that to start with only those items of power implements and machinery may be taken up which offer greatest scope for acceptance by the cultivators.



नमो भगवते वासुदेवाय

SUMMARY OF RECOMMENDATIONS

1. In order to watch the progress of introduction of improved implements and machinery, steps should be taken to enumerate them separately at the time of quinquennial livestock census.

(1.5.2)

2. The facilities available at the Annamalai University for the post graduate studies in Agricultural Engineering are inadequate and need to be augmented to a considerable extent.

(2.3.2)

3. Closer coordination between the Departments of Industries and Agriculture in the matter of supply of raw material and manufacturing programme of agricultural implements is recommended. It will also be desirable to associate the Joint Director of Agriculture (Engineering), in the formulation of annual programme of implements manufactured by the industrial units.

(2.6)

4. In order to avoid duplication of efforts and waste of time and expenditure on research in agricultural implements, it is necessary to bring about close integration and coordination of activities of the Agricultural Research Institute, Coimbatore and Agricultural Implements Workshop at Thanjavur. While the Research Testing and Training Centre may be converted into the main research station by amalgamating the research section of the college, regional sub-stations may be set up in important agricultural zones of the State.

(2.8.1)

5. The interchangeability and coordination amongst the agricultural engineering staff of various schemes should be established so as to enrich and improve the working efficiency of the Department.

(2.8.1)

6. Since only a few of the large number of implements recommended by the Department are popular with the ryots, it is suggested that the list may be carefully examined and only those implements may be retained in it which are of real economic use and within the reach of the cultivators.

(3.2 and 3.6)

7. It will be desirable to enlarge the objectives and functions of the Research Testing and Training Centre and include small tractors, power implements and machinery such as power thrashers, power sprayers, etc., in the programme of work.

(3.7.1)

8. Special attention requires to be paid to the designing of a dryer for paddy seeds.

(3.7.2)

9. As hand-tools are still extensively used, particularly in hilly areas, it is necessary to initiate technical studies on them with a view to obtaining maximum efficiency and output by determining the most suitable posture for workers and shape and size of blades, handles and angle of attachment, etc.

(3.7.3)

10. Detailed study of various parts of implements, quality of material required for their manufacture and the measures that could be taken to reduce the cost of implements, without reducing their usefulness or working life, should be taken and the results of study published for the information of manufacturing units and extension agencies.

(3.7.4)

11. As the ordinary cultivator does not have the means to go in for a large variety of single-purpose implements, concerted efforts are required to be made to evolve suitable multi-purpose implements.

(3.7.5)

12. At present, the estimates of requirements of iron and steel for agricultural implements are made, more or less, on an *ad hoc* basis, taking into consideration previous year's figures. It will be desirable to draw up a clear-cut programme regarding the number of implements to be manufactured and estimates for iron requirements should be framed on the basis of schedule recommended by the Team.

(4.5 and 4.12)

13. The present arrangement of exercising check on the utilisation of iron and steel by the fabricators, needs revision. It will be desirable to entrust this work to the Assistant Engineers instead of the District Agricultural Officers.

(4.8)

14. Since the present procurement procedure is lengthy and cumbersome, it is suggested to curtail it by long-term planning and doing away

with the practice now followed of routing indents through the Ministry of Food and Agriculture.

(4.10)

15. The policy of equi-distribution of iron and steel out of the agricultural quota to fabricators requires to be stopped. The Team recommends that the raw material should be supplied to the fabricators on their previous year's production, installed capacity and future manufacturing programme.

(4.11)

16. Like iron and steel and coke and coal, separate quota of pig iron requires to be fixed for agricultural purposes.

(4.13)

17. There appears to be an urgent need of carrying out survey of agencies engaged in the manufacture of implements and categorise them with reference to their capacity and suitability.

(5.2)

18. In order to keep down overhead cost of production, it is suggested that the State Government may encourage suitable production units for the manufacture of special implements in which they possess the requisite technical know-how and experience.

(5.3)

19. Utilisation of cooperatives in the manufacture of implements deserves special attention and in order to achieve it, it will be desirable to draw up a definite programme jointly by the Director of Agriculture and Registrar of Cooperative Societies.

(5.4)

20. In order to ensure standardization of implements and their spare parts, some experienced and well-to-do manufacturers may be encouraged to equip their workers with modern machinery and take up the manufacture of standard implements on a mass scale.

(5.3)

21. One of the State workshops may be suitably equipped for taking up the manufacture, on a mass scale, of some vital parts of implements such as the discs, blades, etc., which require high carbon steel. All these parts must bear the hall mark of the department and made available in sufficient numbers to fabricators who should be required to make use of them and allotted iron only for the other parts of the implements.

(5.6)

22. A special committee consisting of Joint Director of Agricultural Engineering, Research Engineer (Research Testing and Training Centre), Agricultural Engineer (Inspection), Agronomist, Deputy Directors of Agriculture and few progressive farmers, may be set up for the standardization of designs, testing of implements and bringing them on the approved list of the Department.

(5.8)

23. Arrangement should be made for the quality-marking of implements manufactured by various agencies, including industrial units, by appointing a small subordinate staff and utilising the services of Assistant Engineers in the Districts.

(5.9 and 5.9.1)

24. The blue prints and specifications prepared by the Team in consultation with the Research Engineer may be published in the form of leaflets for distribution amongst fabricators and other interested persons.

(5.10)

25. The industrial units engaged in the manufacture of agricultural implements should draw up their own regular programme of manufacture in consultation with the extension organisations and make arrangements for direct sales to the cultivators either through cooperative societies or retail sellers.

(6.4)

26. At times Industrial Units despatch the implements in unassembled condition and send various component parts in several lots which creates great problem for extension agency in assembling them into a finished product.

(6.4)

27. The scope and function of the workshop wings of Extension Centres may be restricted only to the training of village level workers.

(7.2)

28. The training of village artisans may be done at the Industrial Units.

(7.3)

29. While the inservice training for District Agricultural Officers and Assistant Engineers may be arranged at the Research Testing and Training Centre, Coimbatore, training course for A.E.O.s, village level workers

and farmers may be organised at Agricultural Farms and Extension Training Centres.

(7.4)

30. For the demonstration of improved agricultural implements and machinery, a well-organised programme requires to be taken up, particularly to show the increased or additional production or saving in labour through the use of improved agricultural implements.

(8.2)

31. While composite type of demonstration is, no doubt, good, the single-purpose demonstration in the case of implements is also necessary for convincing the farmers of the economy and efficiency of a specific process or item.

(8.2.2)

32. The programme of planning, laying out and recording of demonstration of implements requires to be reviewed so as to bring it on a sound footing.

(8.3)

33. As the demonstration of new implements can best be done by the extension workers fully familiar with local agro-economic conditions, there seems to be no need to appoint an agricultural supervisor in each district for this purpose.

(8.4)

34. The scheme for the provision of demonstration sets of implements with V.L.Ws., B.D.Os. and panchayat unions, requires to be examined so as to improve its working efficiency and retain or add only those implements which are absolutely essential.

(8.5)

35. For implements lent out to cultivators for practical use and demonstration, no charge should be levied.

(8.6)

36. On some seed and demonstration farms, it will be desirable to have power tillers and small tractors with necessary implements for demonstration to the cultivators of surrounding areas.

(8.7)

37. On all agricultural exhibitions and shows, improved implements, suited to local conditions, should be exhibited and simple leaflets in local language, giving briefly use, economics, method of handling, availability of implements, their spare parts and prices, should be distributed amongst the visitors.

(8.8)

38. A conspicuous space should be reserved for the exhibition of improved implements in the important markets of agricultural commodities and leaflets should also be freely distributed at these places.

(8.8)

39. It should be possible for important fabricators to combine their production programme with the training of village artisans and thereby use the latter for introducing and promoting the sale of implements.

(8.10)

40. All short-term and medium-term loans for agricultural implements and machinery should be advanced through the cooperative societies and Revenue Department and Blocks should stop issuing those loans.

(9.5)

41. Since the available experimental data in regard to the increased production as a result of the use of improved implements are very meagre, it is suggested that a well-planned programme of research may be immediately undertaken covering all aspects of tillage operations and implements necessary to produce tilth for optimum crop production and economics of various implements in relation to their capacity.

(10.1)

42. The usefulness of Melur and M.B. plough, which are at present being distributed throughout the State on subsidised basis, should be carefully examined in the light of results of experiments obtained at different Agricultural farms and their use should be popularised only in areas where their utility is fully established.

(10.1)

43. Because of equitable tropical climate and extensive irrigation system, Madras offers considerable scope for multiple cropping and introduction of labour intensive crops. In the light of these conditions, the scope of mechanisation in Madras agriculture requires to be studied, in detail, so as to formulate a definite policy and initiate steps to implement it.

(10.4)



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COMMITTEE ON PLAN PROJECTS

Terms of Reference of the Agriculture Team in relation to the Study of Agricultural Implements

The Team will make an appraisal of the various schemes, both of the Central and State Governments, relating to Agricultural Implements and make such suggestions as it may consider necessary with a view to achieving economy, efficiency and expedition in the working of the schemes.

For the purpose of the study by the Team, Agricultural Implements will be divided into the following categories:—

- (a) Bullock drawn implements;
- (b) Small power implements;
- (c) Hand tools and garden implements;
- (d) Irrigation appliances and machinery;
- (e) Plant protection equipment; and
- (f) Supplementary implements and equipment.

2. The Team will study, and report thereon, all aspects of the progress of various schemes, both of the Central and State Governments, and their efficiency and effectiveness in relation to the manufacture, popularisation and distribution of agricultural implements, particularly the following:—

(i) *Research*

- (a) Progress made in research at all levels at the Central and State Research Stations;
- (b) Testing and trials, including the work done at Regional Testing-cum-Training Centres;

(ii) *Manufacture*

- (a) Availability of raw materials with special reference to the quality of iron and steel required for the manufacture of implements;
- (b) Arrangements for quality control of implements;
- (c) Adequacy of organisation, both public and private, in different States and the country as a whole, for the manufacture of improved implements;

(iii) *Training*

- (a) Study of training facilities in agricultural engineering, training standards, number of trainees, scope for their employment, etc;
- (b) Arrangement for training of village artisans and farmers;
- (c) Follow-up in the field of the training programmes for artisans and farmers;

(iv) *Sale and distribution*

- (a) Review of the methods and organisations employed for the sale and distribution of implements and their effectiveness;
- (b) Role of the cooperatives and departmental seed stores in the distribution of agricultural implements;
- (c) Linking of credit facilities with the distribution of agricultural implements and grant of loans in kind;

(v) *Popularisation*

- (a) Review of the arrangement for demonstrations at the village and block levels, the methods and techniques adopted and need and scope for strengthening of the village and block level set-up;
- (b) Arrangements for repairs and maintenance at the various levels and the role and working of rural workshops;
- (c) Purchase and hiring of implements by Cooperatives and Panchayats;

(vi) *Administrative arrangement*

- (a) Need and scope for strengthening the Agricultural Engineering staff at the District, Regional and State levels;
- (b) Co-ordination among different agencies concerned with research, manufacture, popularisation and distribution of implements.

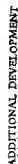
3. The Team will carry out case studies of the different proto-types of important Agricultural Implements and hand tools with a view to judging their efficiency, economy and contribution towards increased production. With a view to facilitating studies and making them realistic, the Team will consult and hold discussions with progressive farmers, manufacturers of agricultural implements and officers and staff of the State Agriculture and other concerned Departments, etc. The Team may co-opt representatives of various interests in the fields of manufacture, supply and use of agricultural implements in different States.

ANNEXURE I

Agricultural Implements and Machinery in Madras, 1961

Sl. No.	District	1	2	3	4	5	6	7	8	Ghanies	
				Ploughs	Carts	Sugarcane Crushers	Tractors	Oil Engines	Electric Pumps		
1.	Chingleput	.	.	.	225,781	38,428	397	166	2,788	11,477	727
2.	Madras	.	.	.	11	75	..	..	1	..	26
3.	South Arcot	.	.	.	436,700	59,824	5,015	137	9,823	7,492	2,144
4.	North Arcot	.	.	.	367,334	41,360	5,644	32	4,755	16,519	1,925
5.	Salem.	.	.	.	550,093	74,242	3,178	37	5,098	13,826	1,728
6.	Coimbatore.	.	.	.	322,915	114,367	2,631	211	3,599	25,536	1,248
7.	Tiruchirappalli	.	.	.	403,510	73,848	2,837	30	5,187	3,005	1,642
8.	Madurai	.	.	.	299,069	56,378	541	36	1,814	8,822	645
9.	Thanjavur	.	.	.	375,877	91,407	527	185	1,612	282	1,329
10.	Ramanathapuram	.	.	.	247,169	60,804	176	463	929	3,567	751
11.	Tirunelveli.	.	.	.	167,987	59,594	2,144	43	1,075	4,976	824
12.	The Nilgiris	.	.	.	2,968	168	2	4	1	..	..
13.	Kanyakumari	.	.	.	32,441	4,042	57	46	149	1	136
TOTAL 1961—		.	.	.	3,427,825	674,537	23,139	1,390	36,831	98,501	13,225
TOTAL 1955—		.	.	.	2,928,071	639,805	15,370	322	29,761	23,968	18,075
TOTAL 1951—		.	.	.	5,549,154	1,596,820	64,377	479	34,027	20,815	48,420

ANNEXURE II





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ANNEXURE III

List of controlled, relaxed and Decontrolled Categories of Steel

Sl. No.	Controlled Categories	Relaxed Categories	Decontrolled Categories
I	2	3	4
1.	Pig Iron.	1. Blooms, Billets, Slabs and Ingots.	1. Tyres, Wheels and Axles.
2.	Blooms, Billets and Slabs (Semis).	2. Bars and Rods.	2. Dog Spikes.
3.	Heavy Structural.	3. Structural.	3. Bolts (including fish bolts), Nuts & Rivets.
4.	Light Structural (including light rails)	4. Rails.	4. Wire Nails.
*5.	Shell Steel, Ingots, Blooms, Billets & Bars.	5. Plates.	
6A.	Heavy Rails & Fishplates.		
6B.	Spikes, Coach Screws & other Rail Fittings		
7A.	Tinplate, thinner than 26 B. G. Terneplate.		
	Black Plate (PCRCA).		
7B.	Tinplate, 26 B. G. to 20 B. G. Terneplate Black Plate (PCRCA).		
8A.	Black Sheets (plain)		
8B.	Black Sheets (Corrugated).		
9A.	Galvanised Sheets (Plain).	6. Black Sheets of 14 G and thicker.	5. Tool Steel in any unfabricated or semifabricated form.
9B.	Galvanised Sheets (Corrugated).		
10.	Plates (Ship-building)		

I	2	3	4
11.	Plates (Ordinary M. S. including Boiler & H. T.)	7. Hot Rolled Strips of 14 G and thicker.	6. Cast Iron Pressure Pipes and Specials.
12.	Plates (Bullet proof).		
13A.	Bars (including Rounds and Squares $\frac{1}{2}$ " and above also).	8. Spring Steel	7. Wire Ropes.
13B.	Rods (including Rounds and Squares below $\frac{1}{2}$ ")	9. Sleepers.	8. Any Variety of pipes, Tubes and Specials.
*14A.	Bolts, Nuts and Washers (including Fish Bolts, Nuts and Washers).	10. Fishplates.	9. Box Strapping
*14B.	Rivets.		
15B.	Wire (Telegraph).	11. Pig Iron.	
*16.	Wire Nails.		10. Barbed Wire.
17.	Wire (Other kinds & Bright Wire).	12. Cast Iron Ingot Moulds (Broken or unbroken).	
*18.	Spring Steel (of any of the above categories).		
19.	Hoops and Strips.		
*20.	Tool Steel		

*Distribution Control over these categories has been withdrawn .

ANNEXURE IV

Case study of the time consumed in the Procurement and Supply of Iron & Steel (Agricultural Quota).

Sl. No.	Particulars	1958-59		1959-60		1960-61		1961-62		1962-63	
		I half	II half	I half	II half	I half	II half	I half	II half	I half	II half
1	2	3	4	5	6	7	8	9	10	11	12
1.	Date of Submission of requirement by the Director of Agriculture . . . . .	..	..	..	..	..	..	1-2-61	4-7-61	1-2-62	13-7-62
2.	Date of despatch of Iron & Steel Quota from the Ministry of Food and Agriculture to the Director of Agriculture	15-9-58	24-3-59	26-9-59	27-4-60	1-8-60	19-11-60	19-5-61	28-12-61	19-6-62	14-12-62
3.	Date of receipt of above letter at Director of Agriculture's Office . . . . .	..	..	..	..	..	27-11-60	17-6-61	3-1-62	11-7-62	16-12-62
4.	Date of issue of quota certificate . . . . .	..	..	..	..	..	15-12-60	29-6-61	20-2-62	16-7-62	1-2-62
5.	Date of Receipt of quota certificate by the Registered Stockists . . . . .	..	..	..	..	..	..	4-7-61	22-2-62	25-7-62	7-2-63
6.	Date of submission of Indent by Registered Stockists to Iron and Steel Controller along with quota certificates . . . . .	..	..	..	..	..	..	12-7-61	2-3-62	17-9-62	12-3-63

1	2	3	4	5	6	7	8	9	10	11	12
7.	Date of Planning by Iron & Steel Controller	4-4-59	10-8-59	28-7-49	13-9-60	17-12-60	15-4-61	10-1-62	6-7-62	9-1-63	..
8.	Date of Receipt of information from main producer for financial arrangement	..	..	..	..	..	..	24-3-62	16-11-62	..	..
9.	Names of Main Producers	Tata	Tata	Tata	M/s Ram Machinery Corpn. Madras.	Tata	Indian I&S Coy., Calcutta.	Indian Iron.	Indian Iron.	Hindustan Steel Ltd.	..
10.	Date of work order	11-8-59	29-9-59	21-10-59	4-3-61	3-1-61	10-8-61	..	..	..	..
11.	Date of deposit of advance to main producers with Form C	..	..	..	..	..	..	11-4-62	1-12-62	..	..
12.	Date of loading at factory	..	..	..	..	..	17-1-63	..	..	..	..
13.	Date of release of Wagon	..	..	..	..	..	..	..	..	..	..
14.	Date of intimation by Regd. Stockists about the stock received	..	26-9-62	19-6-62	4-2-62	21-7-62	9-2-63	..	..	..	..
15.	Date of issue of permits to Fabricators	..	..	..	..	..	21-2-63	..	..	..	..
16.	Date of quantity lifted by Fabricators	..	..	..	..	..	26-2-63 to 12-3-63	..	..	..	..

NOTE :—Till the first half of 1960-61 the Industries Department was dealing with the Iron and Steel Quota. Complete information was not readily available.

ANNEXURE V

Sketch Drawings of some of the Important Implements

- 1. Buck Scraper**
- 2. Bund Former**
- 3. Seed Drill**
- 4. Ridge Plough**
- 5. Details of Ridge Plough**
- 6. Light Mould Board Plough**
- 7. Melur Plough**
- 8. Groundnut Decorticator (Pedal Operated)**
- 9. Bullock drawn Groundnut Harvester (Digger)**
- 10. Groundnut Grader**





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ANNEXURE VI

Schedule of Iron & Steel requirements of Improved Implements

Sl. No.	Name of the Implements	Size of the Material	Quantity	
1	2	3	4	
1. Burmese Settun.	(i)	$\frac{3}{8}$ " \times $1\frac{1}{2}$ " M. S. Flat.	5.250	KG
	(ii)	$\frac{1}{4}$ " \times $1\frac{1}{2}$ " M. S. Flat.	6.000	KG
	(iii)	$\frac{1}{4}$ " \times 1" M. S. Flat.	2.550	KG
	(iv)	$\frac{1}{4}$ " \times $2\frac{1}{2}$ " Steel Flat.	6.250	KG
	(v)	$2\frac{1}{2}$ " M. S. Round.	6.540	KG
	(vi)	1 $\frac{1}{2}$ " G. I. Pipe	3.5	feet.
	(vii)	$\frac{1}{8}$ " M. S. Sheet.	1.250	KG
	(viii)	10 G. W. Rod.	25	Nos.
2. R. E. Guntaka.	(i)	$\frac{3}{8}$ " \times $1\frac{1}{2}$ " M. S. Flat.	3.750	KG
	(ii)	$\frac{1}{4}$ " M. S. Sheet.	1.250	KG
	(iii)	$\frac{3}{8}$ " \times 3" Steel Flat.	4.500	KG
	(iv)	$\frac{3}{8}$ " \times 2" M. S. Flat.	8.000	KG
	(v)	$\frac{3}{8}$ " \times 6" \times 18" Steel Sheet.	4.5000	KG
3. Inter cultivator.]	(i)	$5/16$ " \times 1" M. S. Flat.	2.520	KG
	(ii)	$\frac{3}{8}$ " \times $1\frac{1}{2}$ " M. S. Flat.	6.250	KG
	(iii)	$\frac{1}{4}$ " \times 1" M. S. Flat.	1.2000	KG
	(iv)	$\frac{1}{4}$ " \times 1" M. S. Flat.	0.540	KG
	(v)	$\frac{1}{4}$ " M. S. Round.	2.700	KG
	(vi)	$\frac{1}{4}$ " M. S. Round.	1.200	KG
	(vii)	G. I. Wire.	2.00	feet
	(viii)	$\frac{1}{4}$ " \times 1" M. S. Flat.	4.000	KG
	(ix)	$\frac{1}{4}$ " \times $1\frac{1}{2}$ " M. S. Flat.	0.500	KG
	(x)	2" M. S. Round (6" long).]	2.730	KG
	(xi)	$\frac{1}{4}$ " \times 3" Steel Flat.	0.810	KG
	(xii)	Spring (Internal dia) 6" long	1	No.
	(xiii)	$\frac{1}{8}$ " M. S. Sheet (1 sft).	1.250	KG
	(xiv)	10 G. W. Rods.	15	Nos.
4. Buck scraper.]	(i)	$\frac{1}{4}$ " M. S. Round.	1.900	KG
	(ii)	$\frac{1}{4}$ " M. S. Sheet	13.125	KG
	(iii)	$\frac{1}{4}$ " \times 2" Steel Flat.	0.700	KG
	(iv)	$\frac{1}{4}$ " \times $1\frac{1}{2}$ " M. S. Flat.	10.000	KG
	(v)	$\frac{1}{4}$ " \times $2\frac{1}{2}$ " M. S. Flat.	2.600	KG
	(vi)	$1\frac{1}{4}$ " M. S. Round (6" long) ;	0.936	KG
	(vii)	10 G. W. Rods	10	Nos.
5. Light Ridger .	(i)	Rough cast iron piece	6.000	KG
	(ii)	$1\frac{1}{2}$ " G. I. Pipe	2.50	feet
	(iii)	$\frac{1}{4}$ " \times $1\frac{1}{2}$ " M. S. Flat (12" long)	6.000	KG
	(iv)	$\frac{1}{4}$ " M. Sheet ($3\frac{1}{2}$ sft).	4.375	KG
	(v)	$\frac{1}{8}$ " \times 3" \times 4" Steel Flat.	0.750	KG
6. Heavy Ridger .	(i)	Rough cast iron piece	9.000	KG
	(ii)	$1\frac{1}{2}$ " G. I. Pipe	4.00	feet
	(iii)	$\frac{1}{4}$ " M. S. Sheet ($\frac{1}{2}$ sft.)	0.576	KG
	(iv)	$\frac{1}{4}$ " M. S. Round (9")	0.450	KG
	(v)	$\frac{1}{4}$ " \times $1\frac{1}{2}$ " M. S. Flat.	0.010	KG
	(vi)	$3/16$ " M. S. Sheet	3.750	KG
	(vii)	Steel share point 5" \times 4"	1	No.
	(viii)	$\frac{3}{8}$ " M. S. Round (3').	1.350	KG

1	2	3	4
7.	Bund former	(i) $\frac{3}{4}$ " \times $1\frac{1}{2}$ " M. S. Flat (12'). (ii) $\frac{1}{4}$ " M. S. Flat (6 Sft)	6'000 KG 7'500 KG
8.	Melur plough	(i) Cast iron share (ii) $5/16$ " M. S. Round	1'500 KG 0'300 KG
9.	P. S. G. Plough No. 16A.	(i) Rough casting for body (ii) $\frac{1}{4}$ " \times 2" M. S. Flat. (iii) Steel casting share (iv) Rough casting land side (v) $\frac{1}{4}$ " M. S. Sheet	5'000 KG 2'000 KG 2'250 KG 2'200 KG 2'300 KG
10.	P. S. G. Plough . No. 4.	(i) Rough casting (ii) Steel casting (iii) $\frac{1}{4}$ " M. S. Sheet	7'500 KG 1'000 KG 1'000 KG
11.	P. S. G. Plough No. 15.	(i) Rough casting (ii) $\frac{1}{4}$ " M. S. Sheet (iii) $3/16$ " or $\frac{1}{4}$ " steel flat (iv) $\frac{1}{4}$ " \times $\frac{1}{2}$ " Square (1')	10'500 KG 1'000 KG 0'750 KG 1'500 KG
12.	P. S. G. Plough No. 6.	(i) Rough casting steel (ii) $\frac{1}{4}$ " M. S. Sheet (iii) Rough casting (Frog)	0'800 KG 1'000 KG 1'200 KG
13.	Castor sheller	(i) $\frac{3}{4}$ " G. I. Pipe (ii) $5/8$ " Steel shaft (iii) $5/8$ " G. I. Flange (iv) $\frac{1}{4}$ " \times 1" M. S. Flat (v) $\frac{1}{4}$ " Pipe (vi) 1" dia M. S. Round (vii) White metal	9" long 1'00 foot. 1 No. 1 No. 6" Long 0'150 KG 0'500 KG
14.	Groundnut decorticator.	(i) $\frac{1}{4}$ " \times $1\frac{1}{2}$ " M. S. 'L' angle (ii) $\frac{1}{4}$ " \times 1" M. S. Flat (iii) $\frac{1}{4}$ " \times 1" M. S. Flat (iv) $5/16$ " \times $1\frac{1}{2}$ " M. S. Flat (v) 1" M. S. Round (vi) $2\frac{1}{2}$ " M. S. Round (vii) Inner dia 1" Ball bearings (viii) $1/16$ " M. S. Sheet (42 Sft) (ix) $2\frac{1}{2}$ " dia, 1" thick, 21 teeth gear (x) 9" dia, 1" thick, 80 teeth gear (xi) 26 gauge G. I. Sheet (6' \times 3') (xii) $\frac{1}{2}$ " M. S. Round ($1\frac{1}{2}$ "). (xiii) 1" M. S. Round (2"). (xiv) $\frac{1}{4}$ " M. S. Sheet (1 Sft). (xv) Soldering lead (xvi) Rough C. I. Rotor (xvii) Rough C. I. fly wheel (15" dia, 1" thick) (xviii) $\frac{1}{4}$ " steel balls	12'600 KG 0'750 KG 1'750 KG 0'775 KG 3'600 KG 3'270 KG 2 Nos. 2'815 KG 1'000 KG 3'500 KG 1 sheet 0'900 KG 2'400 KG 1'250 KG 0'500 KG 20'000 KG 14'000 KG 24 Nos.
15.	Duster	(i) 30 Gauge G. I. Sheet (ii) $\frac{1}{4}$ " M. S. Round (iii) $1/16$ " M. S. Sheet (iv) Soldering lead	1'000 KG 0'450 KG 0'200 KG 0'100 KG

1	2	3	4
16.	Sprayer . . .	(i) $\frac{1}{2}'' \times 1\frac{1}{2}''$ M. S. Flat (4'). (ii) $\frac{1}{2}''$ M. S. Round (1'). (iii) $\frac{7}{8}''$ M. S. Round (1'). (iv) $\frac{1}{2}''$ G. I. Pipe (v) 10 G. W. Rods (vi) Soldering lead	1.600 KG 0.900 KG 1.050 KG 4.500 KG 5 Nos. 0.250 KG
17	Sugarcane crusher (Power driven)	(i) $2'' \times 36''$ Steel shaft (ii) $2'' \times 22''$ Do. (iii) $2'' \times 30''$ Do. (iv) $2'' \times 32''$ Do. (v) $2'' \times 22''$ Do. (vi) $\frac{1}{2}''$ M. S. Sheet (vii) G. W. Rods	70.980 KG 5.000 KG 10 Nos.



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ANNEXURE VII

Operational efficiency of Important Improved Agricultural Implements

Sr. No.	Name of implement	Operation	Quantum of outturn	Cost per unit out-turn	Remarks
I	2	3	4	5	6
				Rs.	
1. Mould-board plough					
(A) Light type					
(i)	P.S.G. 5 Bar point	} Ploughing	50/cents/day	0.20/acre	
(ii)	Cooper No. 25				
(iii)	Kirloskar gurjar 2				
(iv)	Ransom Meston				
(B) Medium type					
(i)	P.S.G. 16A Band C	} Ploughing	40/cents/day	0.50/acre	
(ii)	Cooper No. 11				
(iii)	Kirloskar No. 14				
(iv)	Cooper No. 26				
(v)	Kirloskar Zomindar				
(C) Deep type					
(i)	P.S.G. No. 32	} Ploughing	30/cents/day	0.75/acre	
(ii)	Cooper No. 24				
(iii)	Kirloskar No. 18				
(iv)	Ransom victory				
2.	Burmese settun	Green manure trampling, and puddling	2/acres/day	5.00/acre	
3.	Junior Hoe or Inter cultivator.	Intercultivation	Do.	2.50/acre	
4.	R.E. Guntaka	Mulch forming, digging, etc.	Do.	2.50/acre	
5.	Buck scraper	..	..	..
6.	Ridge plough	Forming trenches & ridges	2 acres/ day at 2 feet intervals.	4.25/acre	
7.	Bund former	Forming bunds	5 acres/day	1.37/acre	
8.	Melur plough	Ploughing	0.75/acre/day	7.00/acre	
9.	Castor sheller	To break open the shell to release kernels.	750 lbs/day	1.75/1000 lbs.	

1	2	3	4	5	6
				Rs.	
10.	Groundnut Decorticator	Shelling ground-nuts for seed purpose.	One bag/hour	0.32/bag.	
11.	Green Manure Trampler.	Trampling	3 acres/day	1.50/acre	
12.	R. B. Seed-drill	Sowing	6 acres/day]	0.83/acre	
13.	Turmeric polisher	Polishing & removal of fibrous matter.	1 Ton/day	4.00/Ton	
14.	Erection of 3" size filter points.	Irrigation unit	..	350/each	



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(1)	(2)	(3)	(4)	(5)	(6)	Hrs. Rqd.	(8)	(9)	(10)	Hrs. Rqd.	(12)	(13)	(14)	(15)	Rs.
1	Paddy	1. Pre-sowing operations (Ploughing and Plank- ing). (a) Ploughing (b) Spreading and Tram- pling Green Manure (10 Women Coolies = 7 Men)	6	Country Plough.	144	144	1	Plough Wet- land Puddler.	32 8	32 8
					56	..	..	..	..	..	..	..	..	..	..
					200	144	..	..	..	92	92	..	108	52	46.50
		2. Sowing. (a) Preparation of Nur- sery 10 cents. (b) Transplanting (20 Women = 15 Men)	1	..	20	14	..	..	20	14	..	No saving.	..	..	2.00
		3. Manuring. Top dressing of fertilizers	1	..	120	..	..	..	128 (One man more for rope sowing in line)	..	..	No saving.	..	..	..
		4. Intercultivation. Weeding (20 women per weeding = 15 Men)	2	Hand Hoe	240	..	2	Japanese Inter- cultivator (3 Men, 4 women per acre).	96	..	Nil	144	..	36.00	..
		5. Harvesting and Stack- ing (20 women = 15 men)	1	Sickle	120	..	1	No improved implements.	120	..	..	No saving.	..	..	..
		6. Threshing (4 men + 6 women), and winnowing (2 men + 3 women).	1	..	104	..	1	No improved implement for threshing. P.S.G. Hand winnowing machine is used.	68	..	..	..	..	3.00	..
									24						
									92						
7.	Marketing	7. Marketing	1	Market the produce at field.	812	158	12	..	556	106	1	256	52	83.50	..
		TOTAL	13	..	..	..	..	..	..	..	..	..	..	..	..
2	Ragi	1. Pre-sowing operations (Ploughing, planking), Bund forming and Raising Nursery 4 cents.	4	Country Plough.	64	64	3	2 Victory	56	56	1	8	8	5.00	..
		2. Sowing. Transplanting Pulling out seedlings from nursery.	1	8 men	64	..	1	1 Country Bund former	4	4	..	..	..	..	..
			1	20 women	152	..	1	20 and 5 men	152	No saving.
3.	Manuring 5 Tons F.Y.M.		1	1 pair & 1 man for cart	64	8	1	Do.	64	68	1	Do.



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[illegible]



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1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
6	Sugarcane.	1 Presowing operations (Ploughing, Planking) Forming ridges and Furrowing. Rectifying ridges	4 Country Plough 1 1/2 man 1 8 men	4 Country Plough 1 1/2 man 1 8 men	64 4 64	64 4 64	3 Victory Plough 1 Ridge Plough 1 Rectifying by man.	60 4 24	60 4 24	60 4 24	60 4 24	60 4 24	60 4 24	60 4 24
2.	Sowing. Preparing setts Planting setts		1 6 men 1 8 women	1 6 men 1 8 women	132 48 48+	68 .. 8	1 Same 1 Same	88 28	88 28	64 ..	1 44 .. No saving.	4 ..	4 ..	12.50
3.	Manuring, 10 Tons F.Y.M.		1 2 pair bullocks 2 men 1 man + 4 women.	1 2 pair bullocks 2 men 1 man + 4 women.	56 6	.. 8	1 Do. 1 Do.	56 64	56 64	8 8	Do. Do.	Do. Do.	Do. Do.	Do. Do.
	Loading, carting and spreading. 200 lbs. Ammonia sulphate		2 6 women	2 6 women	36	..	2 Same	36	36	..	..	..	..	..
4.	Intercultivation Earth-feeding up.		1 10 men 1 8 women	1 10 men 1 8 women	80 48	..	1 Same	80	80	..	..	Do.	Do.	Do.
	Threshing twice		2 20 women 1 5 men	2 20 women 1 5 men	120 5	..	1 Same 2 Same	48 120	48 120	..	..	Do. Do.	Do. Do.	Do. Do.
5.	Harvesting and Stacking, Bundling		10 women	10 women	130	..	1 Same	130	130	..	..	Do.	Do.	Do.
6.	Crushing the cane	Is done on contract Rs. 5/- per pothi for Jaggery making in 1 pothi = 285 lbs. 60 Pothis Rs. = 300/-.	16	16	71	76	16	16	670	72	1	44	4	12.50
TOTAL														
There are no improved methods available for operations like sowing, manuring, intercultural and harvesting. Crushing the canes is done on contract @ Rs. 5/- per pothi of jaggery.														
7	Cotton Irrigated Cam- bodia.	1. Presowing operations (Ploughing and Planking).	4 Country Plough 1 8 men	4 Country Plough 1 8 men	64 64	64 ..	3 2 Victory 1 Country 1 Ridge Plough	56 4	56 4	56 4	1 8 .. 60	8 .. 4	8 .. 4	5.00 13.50
2.	Sowing and Hand dib- bling.		1 15 women	1 15 women	96	..	1 15 women	96	96	..	..	..	..	..
3.	Manuring 5 Tons F.Y.M.		1 1 pair 1 1 man for cart.	1 1 pair 1 1 man for cart.	64	8	1	74	74	8	.. No saving.	..	..	..
	Spreading Ammonia Sulphate		1 1 + 4 women	1 1 + 4 women	130	..	1 Same	130	130	Do.	Do.	Do.



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ANNEXURE IX

Savings in Man Hours, Bullock Pair Hours and in Money Values in the cultivation of various Crops in Madras by improved implements.

Name of Crops	Pre-sowing operation & ploughing			Sowing			Manuring			Interculture Hoeing and Weeding			Harvesting			Threshing & Winnowing			Total			Remarks
	M. H.	B. H.	M. V.	M. H.	B. H.	M. V.	M. H.	B. H.	M. V.	M. H.	B. H.	M. V.	M. H.	B. H.	M. V.	M. H.	B. H.	M. V.	M. H.	B. H.	M. V.	
2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Paddy	108	52	46.50	8	2.00	..	..	..	..	144	..	36.00	..	..	..	12	..	3.00	256	52	83.50	In improved method 1 more man is required for transplanting to hold rope for line planting.
1 Ragi	68	4	18.50	..	..	..	..	..	..	..	..	..	..	..	..	64	32	18.00	132	36	36.50	Power threshing is done on common basis. (a) Rs. 1/- per bag of grain. Total Rs. 10/- average field 10 bags.
1 Ground-nut	8	8	5.00	6	..	1.50	..	..	..	..	..	..	..	..	..	Sold as pods. No workable decorticator has so far been evolved.			14	8	6.50	..
4 Cotton (Dry) Karunkanni	8	8	5.00	4	..	1.00	No manuring for unirrigated crop.	116	4	27.5	..	..	..	..	..	Sold in the field			128	4	33.50	Marketing of Cotton is usually done on the field and the trader take the deliver from the field itself
5 Cotton (Irrigated)	68	4	18.50	..	..	..	..	202	8	47.5	..	..	..	..	..	Do.			270	4	66.00	..
6 Cumbu	8	8	5.00	10	6½	44.99	..	116	4	27.50	..	..	..	..	..	64	32	22.00	198	42½	59.49	Power thresher Rs. 1/- per bag. Average 6 bags Rs. 6/-.
7 Chotam	8	8	5.00	10	6½	4.00	..	116	4	27.50	..	..	..	..	..	64	32	21.00	198	42½	58.49	Power threshing. Average 7 bags for Rs. 7/-.
8 Sugarcane	44	4	12.50	Crushing is done on contract at the rate of Rs. 5/- per ton of 280 lbs. of sugary, usual yield 60 bolls.			44	4	12.50	There are no improve methods available for operations in sugarcane cultivation.



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ANNEXURE X

Comments of the I.A.R.I., State Government, Central Ministries and Planning Commission on the Report of the Team and Proceedings of the Final Meeting with the Chief Minister, Madras State.

Comments of the Indian Agricultural Research Institute :—
Recommendation—1.

It has been suggested that enumeration of agricultural implements should be done at the time of quinquennial livestock census. Unless the State has before it, data on the available agricultural implements and also details of distribution every half year or yearly, it may be practically impossible for the State to plan the programme on agricultural implements and raw materials, etc. It is, therefore, suggested that immediate steps should be taken to assess the details, say, for the year ending March, 1964, to which the future half yearly supplies made in the State should be added to arrive at the exact position. It should not be left for quinquennial census.

Recommendation—19.

From the details made available at page 29 it is observed that there are over 150 approved fabricators and 17 industrial manufacturing units in the State. It is not clear if this existing manufacturing strength available is insufficient to meet the needs of the State. The co-operatives perhaps can, with the advantage, attend to the distribution of the implements manufactured by the existing agencies rather than take up manufacture. A decision, however, will have to be taken up by the State after a very careful study of the demand and supply position of agricultural implements.

Recommendation—20.

Effective standardization could come about only when the State makes efforts to adopt only a few sizes of implements. If there are too many types it is not known how even well-to-do experienced manufacturers can manufacture standard implements and bring about any standardisation. No doubt, such workshops will be able to turn out better quality goods because of better production equipment and technique.

Recommendation—33.

There is no doubt that demonstration of new implements can best be done by the Extension Workers fully familiar with the agro-economic conditions, but it is not known if in view of the multifarious work, they have to do, these Extension Officers have been able to give the required attention to implements demonstrations. This should be assessed and the staff be strengthened to intensify the implements demonstration programmes.

The various other recommendations made are generally in order and if implemented by the State would considerably help the Improved Implements Programme and would enable farmers to get their requirements much quicker.

FOOD AND AGRICULTURE DEPARTMENT
GOVERNMENT OF MADRAS

Letter No. 123989 FIV/63.

From

Shri S. Visvanathan, I.A.S.,
Secretary to Government.

To

The Research Officer,
Committee on Plan Projects,
Agriculture Team,
Planning Commission,
Government of India,
NEW DELHI.

Dated: Fort St. George, the 5th February, 1964.

Sir,

Subject:—Agricultural Implements—Comments on the Draft Report on improved agricultural implements in Madras State-- Forwarded.

*References—This Government's Letter No. 123989 FIV/63-9, Food and Agriculture, Dated 29th November, 1963.
Your Letter No. COPP/Agri./F.2/63, dated 30th December, 1963.*

I am directed to convey in the Annexures to this letter the comments of this Government on the recommendations made in the draft Report on Improved Agricultural Implements in Madras State of the Agricultural Team of the Committee on Plan Projects.

The receipt of this letter may kindly be acknowledged.

Yours faithfully,

Sd./- (S. Ranganathan)

For Secretary to Government.

Copy to the Director of Agriculture, Madras-5. Forwarded/By Order

Sd./-

Superintendent.

**COMMENTS OF THE STATE GOVERNMENT ON THE RECOMMENDATIONS
OF THE TEAM**

No. of recom- men- dation	Gist of recommendation	Comments of the State Government
1	2	3
1	In order to watch the progress of introduction of improved implements and machinery, steps should be taken to enumerate them separately at the time of quinquennial livestock census.	Still under consideration.
2	The facilities available at the Annamalai University for the post-graduate studies in Agricultural Engineering are inadequate and need to be augmented to a considerable extent.	Do.
3	Closer coordination between the departments of industries and agriculture in the matter of supply of raw material and manufacturing programme of agricultural implements, is recommended. It will also be desirable to associate the Joint Director of Agriculture (Engineering), in the formulation of annual programme of implements manufactured by the Industrial units.	Accepted.
4	In order to avoid duplication of efforts and waste of time and expenditure on research in agricultural implements, it is necessary to bring about close integration and coordination of activities of the Agricultural Research Institute, Coimbatore and Agricultural Implements Workshop at Thanjavur. While the Research Training and Testing Centre may be converted into the main research station by amalgamating the research section of the college, regional sub-stations may be set up in important agricultural zones of the State.	The recommendation is being examined with reference to the further observations of the Committee on Plan Projects.
5	The interchangeability and coordination amongst the agricultural engineering staff of various schemes should be established so as to enrich and improve the working efficiency of the department.	The suggestion is already being followed to the extent feasible. For instance, Asst. Agricultural Engineers (Mech.) are posted to Soil Conservation Branch if they are trained in Soil Conservation. It is also contemplated to place the Regional Engineers (D. E. S.) to be in-charge of the entire Engineering activities in the Region. Proposals for redesignating all officers in the grade of Agricultural Engineers and forming them into one category with interchangeability are under consideration.

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| <p>6 Since only a few of the large number of implements recommended by the Department are popular with the <i>ryots</i>, it is suggested that the list may be carefully examined and only those implements may be retained in it which are of real economic use and within the reach of the cultivators.</p> | Accepted. |
| <p>7 It will be desirable to enlarge the objectives and functions of the Research Testing and Training Centre and include small tractors and power implements and machinery such as power thrashers, power sprayers, etc., in the programme of work.</p> | The Indian Council of Agricultural Research will be addressed for its concurrence to this proposal. |
| <p>8 Special attention requires to be paid to the designing of a drier for paddy seeds.</p> | Accepted. |
| <p>9 As hand-tools are still extensively used, particularly in hilly areas, it is necessary to initiate technical studies on them with a view to obtaining maximum efficiency and output by determining the most suitable posture for workers and shape and size of blades, handles and angle of attachment, etc.</p> | Accepted. |
| <p>10 Detailed study of various parts of implements, quality of material required for their manufacture and the measures that could be taken to reduce the cost of implements, without reducing their usefulness or working life, should be taken and the results of study published for the information of manufacturing units and extension agencies.</p> | Accepted. |
| <p>11 As the ordinary cultivator does not have the means to go in for a large variety of single-purpose implements, concerted efforts are required to be made to evolve suitable multipurpose implements.</p> | The Director of Agriculture has been asked to examine this recommendation further and submit a report. |
| <p>12 At present, the estimates of iron and steel for Agricultural implements are made more or less, on an <i>ad hoc</i> basis, taking into consideration previous year's figures. It will be desirable to draw up a clear-cut programme regarding the number of implements to be manufactured and estimates for iron requirements should be framed on the basis of schedule recommended by the Team.</p> | This Government will try to work out the requirements of this State in respect of Iron and Steel for Agricultural Implements on a more scientific basis taking into consideration the needs of the various manufacturing agencies to the extent possible. |
| <p>13 The present arrangement of exercising check on the utilisation of iron and steel by the fabricators, needs revision. It will be desirable to entrust this work to the Asstt. Engineers instead of the District Agricultural Officers.</p> | Accepted. |
| <p>14 Since the present procurement procedure is lengthy and cumbersome, it is suggested to curtail it by long-term planning and doing away with the practice now followed of routing indents through the Ministry of Food and Agriculture.</p> | Accepted. |
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- 15 The policy of equi-distribution of iron and steel out of the agricultural quota to fabricators requires to be stopped. The Team recommends that the raw material should be supplied to the fabricators on their previous year's production, installed capacity and future manufacturing programme.
- The present system of equal distribution of iron and steel is working satisfactorily. Unequal distribution on production capacity bristles with practical difficulties in assessing the equipment and turn over. The recommendation can be implemented only when there is a guarantee that the full requirements of the fabricators by way of raw material will be complied with by the Steel Mills. In the circumstances, the present system may be continued and revised when the supply position improved.
- 16 Like iron and steel and coke and coal, separate quota of pig iron requires to be fixed for agricultural purposes.
- The requirements of pig iron for agricultural purposes are not much to warrant a separate quota being fixed as for iron, steel, coke and coal.
- 17 There appears to be an urgent need of carrying out survey of agencies engaged in the manufacture of implements and categorise them with reference to their capacity and suitability.
- The recommendation is accepted in principle. But this may involve employment of special staff, the financial implications of which are under examination.
- 18 In order to keep down overhead cost of production, it is suggested that the State Government may encourage suitable production units for the manufacture of special implements in which they possess the requisite technical know-how and experience.
- This recommendation has already been implemented. The improved agricultural implements distributed under the Pilot Scheme are purchased from a few selected fabricators and a major portion from the production centres of the Government Industrial Units.
- 19 Utilisation of cooperative in the manufacture of implements deserves special attention and in order to achieve it, it will be desirable to draw up a definite programme jointly by the Director of Agriculture and Registrar of Co-operative Societies.
- Still under consideration.
- 20 In order to ensure standardization of implements and their spare parts, some experienced and well-to-do manufacturers may be encouraged to equip their workshops with modern machinery and take up the manufacture of standard implements on a mass scale.
- Accepted.
- 21 One of the State workshops may be suitably equipped, for taking up the manufacture, on a mass scale, of some vital parts of implements such as the discs, blades, etc., which require high carbon steel. All these parts must bear the hall mark of the department and made available in sufficient numbers to fabricators who should be required to make use of them and allotted iron only for the other parts of the implements.
- Accepted.

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- 22 A special committee consisting of Joint Director of Agricultural Engineering, Research Engineer (Research Testing and Training Centre), Agricultural Engineer (Inspection), Agronomist, Deputy Directors of Agriculture and few progressive farmers, may be set up for the standardization of designs, testing of implements and bringing them on the approved list of the department. Accepted.
- 23 Arrangement should be made for the quality marking of implements manufactured by various agencies, including industrial units, by appointing a small subordinate staff and utilising the services of Asst. Engineers in the District. In their Letter No. 75113 FIV/63-6, Food & Agriculture, dated 8-11-63, this Government have already informed the Indian Council of Agrl. Research that necessary instructions have been issued to the State Director of Agriculture, Madras to take suitable action for implementing the recommendation of the Standing Committee on Improved Agricultural Implements and Tools in respect of production and quality marking of agricultural implements. The Director of Agriculture's report on the further action taken in the matter is awaited.
- 24 The blue-prints and specifications prepared by the Team in consultation with the Research Engineer may be published in the form of leaflets for distribution amongst fabricators and other interested persons. Accepted.
- 25 The industrial units engaged in the manufacture of agricultural implements should draw up their own regular programme of manufacture in consultation with the extension organisations and make arrangements for direct sales to the cultivators, either through cooperative societies or retail sellers. Still under consideration.
- 26 At times Industrial Units despatch the implements in unassembled condition and send various component parts in several lots which creates great problem for extension agency in assembling them into a finished product. Implements are now supplied only in assembled condition.
- 27 The scope and function of the workshop wings of Extension Centre may be restricted only to the training of village level workers. Accepted.
- 28 The training of village artisans may be done at the Industrial Units. Still under consideration.

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| <p>29 While the in-service training for district agricultural officers and assistant engineers may be arranged at the Research Testing and Training Centre, Coimbatore, training course for A.E.Os., village level workers and farmers may be organised at Agricultural Farms and Extension Training Centres.</p> | <p>The in-service training for B. Sc (Ag.) is not necessary but the training may be given to others. The question of imparting in-service training for Asst. Agricultural Engineers along with the Officers from the Industries Department at the Asstt. Agricultural Engineering (Research) Workshop, Coimbatore is under consideration.</p> |
| <p>30 For the demonstration of improved agricultural implements and machinery, a well-organised programme requires to be taken up, particularly to show the increased or additional production or saving in labour through the use of improved agricultural implements.</p> | <p>Accepted.</p> |
| <p>31 While composite type of demonstration is, no doubt, good the single-purpose demonstration in the case of implements is also necessary for convincing the farmers of the economy and efficiency of a specific process or item.</p> | <p>Do.</p> |
| <p>32 The programme of planning, laying out and record of demonstration of implements requires to be reviewed so as to bring it on a sound footing.</p> | <p>Do.</p> |
| <p>33 As the demonstration of new implements can best be done by the extension workers, fully familiar with local agro-economic conditions, there seems to be no need to appoint an agricultural supervisor in each district for this purpose.</p> | <p>Do.</p> |
| <p>34 The scheme for the provision of demonstration sets of implements with V.L. Ws., B.D.Os., panchayat unions, requires to be examined, so as to improve its working efficiency and retain or add only those implements which are absolutely essential.</p> | <p>Do.</p> |
| <p>35 For implements lent out to cultivators for practical use and demonstration, no charge should be levied.</p> | <p>No charge is being levied in Madras State for demonstrating any implement.</p> |
| <p>36 On some seed and demonstration farms, it will be desirable to have power tillers and small tractors with necessary implements for demonstration to the cultivators of surrounding areas.</p> | <p>The recommendation is acceptable. It may be stated in this connection that the Govt. of India, M/O Food & Agriculture (Deptt. of Agriculture) have since intimated this Govt. that an amount of Rs. 6.5 lakhs would be allocated to the State Trading Corporation of India Ltd., New Delhi who would arrange for the import</p> |

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of power tillers from Japan and then distribute the supplies so received to the State Governments based on their requirements. This Government are taking necessary action to procure five Nos. of 10 Horse Power tillers from the State Trading Corporation of India Ltd., for demonstration and trial purposes in the Departmental farms.

- 37 On all agricultural exhibitions and shows, improved implements, suited to local conditions, should be exhibited and simple leaflets in local language, giving briefly use, economics, method of handling, availability of implements, their spare parts, and prices, should be distributed amongst the visitors. Accepted.
- 38 A conspicuous space should be reserved for the exhibition of improved implements in the important markets of agricultural commodities, and leaflets should also be freely distributed at these places. Accepted.
- 39 It should be possible for important fabricators to combine their production programme with the training of village artisans and thereby use the latter for introducing and promoting the sale of implements. The recommendation is accepted. The State Director of Agriculture has been asked to issue necessary instructions to the fabricators manufacturing agricultural implements to train village artisans.
- 40 All short-term and medium-term loans for agricultural implements and machinery should be advanced through the cooperative societies and Revenue Department and Blocks should stop issuing these loans. Still under consideration.
- 41 Since the available experimental data in regard to the increased production as a result of the use of improved implements are very meagre, it is suggested that a well-planned programme of research may be immediately undertaken covering all aspects of tillage operations and implements necessary to produce tilth for optimum crop production, and economics of various implements in relation to their capacity. Accepted.
- 42 The usefulness of Melur and M.B. ploughs, which are at present being distributed throughout the State on subsidised basis, should be carefully examined in the light of results of experiments obtained at different agricultural farms and their use should be popularised only in areas where their utility is fully established. Accepted.

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- 43 Because of equitable tropical climate and extensive irrigation system, Madras offers considerable scope for multiple cropping and introduction of labour intensive crops. In the light of these conditions, the scope of mechanisation in Madras agriculture requires to be studied, in detail, so as to formulate a definite policy and initiate steps to implement it.
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नमो भगवते वासुदेवाय

**MINISTER FOR FOOD & AGRICULTURE
GOVT. OF INDIA**

[No. 42/63-MFA.]

New Delhi.

December, 21, 1963.

My dear Shri A. P. Jain,

With reference to your d.o. letter No. COPP/Agr/F(2)/62-1223 dated the 12th December, to me and your d.o. letter No. COPP/Agr/F(2)/62-1225 dated the 12th December, 1963 to Dr. Ram Subhag Singh, forwarding copies of the draft report of the Agriculture Team on Improved Agricultural Implements in the Madras State. The report has been examined. A note embodying the comments of this Ministry in regard to the summary of recommendations made by the Committee is herewith enclosed.

Yours sincerely,

Sd/- (Swaran Singh).

Shri A. P. Jain, M.P., Leader, Agriculture Team, Committee on Plan Projects, Planning Commission, Link House (4th Floor), 3, Mathura Road, New Delhi.

Subject:—Comments on the draft report on improved agricultural implements in Madras State prepared by the Committee on Plan Projects (Agriculture Team).

1. It is a good suggestion to enumerate at least the most important implements and machinery at the time of the quinquennial livestock census. (1.5.2).

2. Admitting of Agricultural Graduates for the M.Sc. course in Agricultural Engineering will not be desirable at the Annamalai University. Unless a candidate has studied engineering in the Graduate course, he cannot attain the high standard expected of M.Sc. in the subject. Existing Agricultural Engineering Colleges in India do not admit graduates other than engineering graduates to post graduate degree (2.3.2.)

3. The suggestion to have closer co-ordination between the Departments of Industry and Agriculture in the matter of raw material procurements and allocation is useful (2.6).

4. The proposal to have closer co-ordination between Research Testing and Training Centre at Coimbatore and the Agricultural Engineering Section of the Department is also under consideration and we are taking steps for co-ordinating the activities of various other workshops carrying out research. The recommendations made by the Committee in this respect will be kept in mind. (2.8.1).

5. In formulating lists of implements really useful to the farmers, we should not take into consideration the State as a whole but distinct agricultural regions of the State, because it has been noticed that an implement found useful and popular in one part of the State, may not be found useful and popular in other parts, on account of different agro-climate conditions. (3.2 and 3.6).

6. The recommendation that the Research Testing and Training Centres should also undertake research on testing of small tractors and power implements is really useful and is acceptable. (3.7.1).

7. Special attention will be paid to the designing of dryer for paddy seeds. (3.7.2).

8. Special study of hand tools for hilly areas is required. This work may be taken up at the Coimbatore Research Centre. (3.7.3).

9. Similarly efforts should be made to design multipurpose implements. (3.7.5).

10. The distribution of iron and steel should be based on previous year's production, installed capacity and future manufacturing programme, except in the case of those firms which have newly started their production. (4.11).

11. The State Workshop may undertake manufacture of high carbon steel parts such as disc plough, etc. This recommendation is acceptable and may be forwarded to the Tiruchirappally Industrial Workshop in Madras State. This workshop is manufacturing other agricultural implements. (5.6).

12. A special committee consisting of various Agricultural Engineers and officers of Department of Agriculture, farmers, etc., needs to be appointed but it need not be only for the standardisation of agricultural implements. Such a committee should undertake all the work in respect of agricultural implements such as standardization, research, popularisation, manufacture, etc. It is believed that an Advisory Committee on Agricultural Implements already exists in most of the States. Such a committee should be given charge of all the aspects of agricultural implements industry. (5.8)

13. The blue-prints on all India basis are being published by the Directorate of Extension. These blue-prints have been obtained from State Agricultural Engineers, manufacturers, etc. These have already been supplied free of charge to the manufacturers. (5.10).

14. The workshop wings attached to the Extension Training Centre are being expanded in most of the States to cover popularisation of improved agricultural implements in the Block, popularisation of cow dung gas plants, extending servicing facilities to the farmers, training of gramsahayaks and production of agricultural implements for the supply in the District or the Block in which these Workshop Wings exist. These Workshop Wings are now to form a nucleus of agricultural engineering and machinery activities in the particular block or the district in which they have been established. Sufficient money for this purpose is also being set aside. Therefore, it will not be correct to limit the scope and functions of these Workshop Wings only to the training of Village Level Workers. These Workshop Wings will also keep tractors, oil engines, power tillers for hire and hire-purchase as well as spare parts and extend repairing facilities to the local farmers. (7.2).

15. The training of the village artisans, which are required in very large numbers, will be undertaken not only at the Workshop Wings but also at the Industrial Units or even in private workshops. We have already contacted some of the industrialists for this purpose. (7.3).

16. The recommendation that in-service training of various categories of officers is the need of the day and such refresher courses will be arranged. (7.4).

17. Only absolutely essential implements will be kept for demonstration in a V. L. W. Circle. (8.5).

18. The suggestion to have power tillers or small tractors for demonstration to the farmers is considered very useful and is acceptable. (8.7).

19. Display and demonstrations at the Exhibitions and programme for publication are also being intensified. (8.8).

20. The suggestion to take up programme for collecting data in regard to the increased production as a result of the use of improved implements is acceptable and will be considered at the time of the next Agronomy and Agricultural Engineering Committee meeting of the I.C.A.R. and a plan will be drawn up. (10.1).

21. The recommendation regarding the Melur plough and the mould-board plough is accepted. The State Government will be asked to take the necessary steps. (10.1).

PS/CDM-1203/63.

MINISTER
COMMUNITY DEVELOPMENT & CO-OPERATION
INDIA

New Delhi, December 26, 1963.

My dear Ajit Prasadji,

This is with reference to your D.O. letter No. COPP/Agr./F (2) /62-1224, dated the 12th December, 1963 with which you have been good enough to enclose the draft report of the COPP Team on Improved Agricultural Implements in the Madras State. I am particularly happy that the Team has given due emphasis on the utilisation of cooperatives in the manufacture of implements and on drawing up a definite programme in this behalf jointly by the Departments of Agriculture and Co-operatives. I would like to make the following suggestions :—

- (1) The workshop wings attached to Extension Training Centres should be used also as demonstration and servicing centres on improved agricultural implements for the benefit of the artisans. For this purpose short courses of say a week to a fortnight may be arranged at these centres at periodic intervals.
- (2) These wings in addition should undertake responsibility for popularising the improved implements of proven value in at least five surrounding villages treating the programme something like a key village scheme.
- (3) The Committee might suggest some concrete measures for the popularisation of the Gobar gas plant based on their study of the successes and failures of this particular scheme.

Kind regards. Jai Hind.

Yours sincerely,

Sd./- (S. K. Dey)

Shri Ajit Prasad Jain, M.P.,
Leader, Agriculture Team,
Planning Commission,
New Delhi.

D.O. No. 12-2/63-Agri.

Planning Commission

NEW DELHI.

Dated the 6th January, 1964.

My dear Jain,

Please refer to your D.O. No. COPP/Agri/F.(2)/62-1221 dated December, 12, 1963 forwarding a copy of the draft report of the Agriculture Team on improved agricultural implements in Madras State.

2. Comments on the more important items of the report prepared in the Agriculture Division are enclosed. These may kindly be taken into consideration by the Team while finalising the report.

With kind regards,

Yours sincerely,

Sd./- (Shriman Narayan)

Shri A. P. Jain, M.P.
Leader, Agriculture Team,
Committee on Plan Projects,
Planning Commission,
Link House (4th Floor),
3-Mathura Road,
NEW DELHI.



PLANNING COMMISSION

(Agriculture Division)

Comments on the draft Report on Improved Agricultural Implements Madras.

1. Admission of agricultural graduates to the M.Sc. course in agricultural engineering in addition to engineering graduates (pages 18-19-2.3.1).

No doubt I.Sc. (Agri.) can be admitted to B.Sc. Agricultural Engineering course but the admission of agricultural graduates to the M.Sc. Agricultural Engineering may not be desirable as the nature and type of training imparted to B.Sc. (Ag.) in agricultural engineering is quite comprehensive in comparison with the engineering course as part of B.Sc. (Ag.) degree. It may not be easy even for the best students in B.Sc. (Ag.) to cope with the training that is being imparted to M.Sc. in Agricultural Engineering. It is understood that even in the Indian Institute of Technology, Khargapur, B.Sc. (Ag.)s are not admitted to M.Sc. Agricultural Engineering course. It is, perhaps, appropriate to exclude this recommendation from the report.

2. It appears that the State has got sufficient staff of agricultural engineers (32 assistant agricultural engineers posted in different districts under one or the other scheme). They are, however, not fully supported by adequate number of assistants nor there appears to be complete co-ordination among the staff. It may, therefore, be desirable to pool the entire staff and post them to the sections where they are needed most and to strengthen the technical staff trained in agricultural engineering in some districts and other blocks through the States.

3. The Team has recommended that "it will be desirable to enlarge the objectives and functions of the Research Testing and Training Centre and include small tractors and power implements and machinery, such as power threshers, power implements and machinery, etc., in the programme of work", (3.5.1). There cannot be any objection to enlarging the functions of the Research Testing and Training Centre so as to bring within its purview all types of implements that are at present being used in the State. The main problem, however, is whether the existing Centre has got enough technical personnel and other facilities with a view to doing justice to all types of implements. This point, therefore, needs to be looked into in greater detail and its work expanded gradually depending upon the availability of technical personnel and other facilities. As a matter of fact, it would be useful to take a few implements in the

first instance and after success has been achieved in this respect, extend them further.

4. Establishment of rural workshops—it would be advantageous and desirable to establish small rural workshops at the block level for repair and maintenance of improved agricultural implements. Such facilities at present do not exist and such workshops, when established, will go a long way in removing this most serious draw-back.

5. Although the Team has recommended that there is need for co-ordination and provision of suitable number of assistants to assist the existing agricultural engineers, the need for appointing suitable extension officers qualified in agricultural engineering at the block level may be specifically mentioned. Such people should also have adequate knowledge in agriculture.



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Proceedings of the Meeting of the Agricultural Team, Committee on Plan Projects, Planning Commission with the Chief Minister, Madras held on 6th February, 1964 in the Secretariat.

The following recommendations were discussed :—

Recommendation No. 4.

During discussions, it was pointed out that there are three officers engaged in Research in Agricultural Engineering under this Department *viz.*, Assistant Agricultural Engineer (Research) and Research Engineer at Coimbatore and Agricultural Engineer at Tiruvarur. The Leader therefore suggested that these must be co-ordinated and amalgamated to avoid duplication of work. The Leader, however, took note of the need for a separate research wing under Intensive Agricultural District Programme to tackle the problems arising in the Thanjavur area, which is predominantly a wet area. The Director of Agriculture explained that all these three units are under one control *viz.*, Joint Director of Agriculture (Engineering) who reviews critically the work in each centre and therefore there is co-ordination. As regards duplication of work, it was made clear that the programme of work is simultaneously drawn up and care has been taken to see that there is no duplication. The Research Testing and Training Centre of the Indian Council of Agricultural Research which was originally sponsored as regional centre has now become a State Centre, as each State is said to have its own Research Testing and Training Centre. However, its work has a limited objective and is approved by the Indian Council of Agricultural Research, while the Assistant Agricultural Engineer (Research) has different programmes of work. Even as it is, Research on Agricultural Engineering is to be expanded to include testing of pumpsets and Research in problems arising on Minor Irrigation with well-equipped Hydraulic Laboratories. Necessary proposals in this regard have already been submitted to Government. There is no objection to amalgamate these two centres at Coimbatore provided the Indian Council of Agricultural Research agrees to meet the expenditure of the present activities and the proposed extension now pending with the Government together with the staff. It was pointed out by the Leader that the Indian Council of Agricultural Research would agree to the amalgamation and meet the additional expenditure involved.

Recommendation No. 5.

The recommendation has already been accepted by the Government.

Recommendation No. 7.

This recommendation has already been accepted and the Indian Council of Agricultural Research has despatched small tractors for test and trial at the Research Testing and Training Centre.

Recommendation No. 11.

The programme of work to evolve a multi-purpose frame has been accepted and the Department will include in its programme of research to evolve a suitable cheap frame. In this connection Voltas Universal frame came up for discussion and it was pointed out that the firm itself has stopped production due to lack of demand on a mass scale. The Leader also pointed out that there is need to evolve a cheap type of frame which would serve as a multi-purpose frame to which any agricultural implements such as ploughs, seed drills, etc., could be attached.

Recommendation No. 12.

This is also accepted and in future, the assessment will be made in respect of controlled commodities on a rational basis.

Recommendation No. 15.

As regards equal distribution, it was pointed out that the present policy of equal distribution affects people who are more interested in the production of agricultural implements than those who may take up production as a stop gap arrangement. This was accepted in principle. However, difficulties in implementing was explained in view of the fact that the supply is far below the demand. The Committee agreed that we should make a move to request for additional allotment of sheets.

Recommendation No. 16.

The requirements of pig iron for purposes of manufacturing of agricultural implements are not at all large and therefore, it was agreed that there is no need to have a separate quota for agricultural purposes. It was, however, pointed out that there is need for pig iron for manufacture of pumps and motors for agricultural purposes. The Chief Minister was pleased to point out that this would come under Industries Department and separate quota could be obtained by the Industries Department for distribution for those engaged in the manufacture of pumps and allied agricultural machinery.

Recommendation No. 17.

This was accepted in principle and may be taken up after examining the financial implications as this will involve special staff.

Recommendation No. 18.

The recommendation stands implemented since improved agricultural implements distributed under Pilot Scheme are mostly supplied by the Industrial Units of the Industries Department.

Recommendation No. 23.

The need for quality marking of implements was agreed and this could be done. It was pointed out that there is need for a special staff i.e. 10 Agricultural Engineering Supervisors and attendant staff under the Assistant Agricultural Engineers and that this would be sanctioned for the work of quality marking and also for checking of utilisation of raw materials by the fabricators. The Supervisor would also be in charge of distribution of improved implements and will serve as a liaison officer between the Extension Officers and the local Production Units. As regards standardisation, it was agreed that vital parts could be manufactured in one unit of the Industries Department. The Director of Agriculture explained that in as much as Madras State is concerned, the manufacture is mostly done at the Government Industrial Units of the Industries Department. This work could be done by the Industrial Units of the Industries Department where facilities are available. The Chief Minister desired that Industrial Cooperatives may also be entrusted with this type of work.

Recommendation No. 27.

There are workshop wings attached to the four Rural Extension Training Centres at T. Kullupatti, Bhavanisagar, S. V. Nagaram and Pattukottai, where the village level workers receive their pre-service training. In these four Training Centres, the services of the training officers of the workshop wings are utilised for delivering lectures on certain subjects to the Village Level Workers. In the other Rural Extension Training Centres where there are no workshop wings, the workshop mechanic attends to this work. The object of establishing workshop wings is for training rural artisans in blacksmithy/carpentry and not for exclusive training of Village Level Workers. But the workshop wings are incidentally utilised for the village level workers also for their training in carpentry/blacksmithy. This Government have sanctioned the affording of repairing and servicing facilities at the workshop wing, T. Kallupatti on pilot basis. The scheme will be extended to other workshop wings in due course.

Recommendation No. 28.

The Industrial units under the Block programme are mainly training centres intended for giving training to the rural artisans to improve their skill and technique. After satisfactory completion of the training, these training centres will be converted into either production centres or Industrial Cooperatives organised by the trainees. The recommendation has already been under implementation in this State.

Recommendation No. 29.

The inservice training was accepted in principle and that for District Agricultural Officers and Extension Officers, this could be included in the existing in-service training for them. As regards the Assistant Agricultural Engineers, the Supervisors and the Officers of the Industries Department, a separate in-service training was accepted.

Recommendation No. 1, 9 and 40.

These recommendations which were under examination by Government were discussed. It was suggested that early orders may be issued.



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